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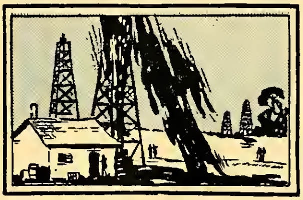
Louisiana Conservation REVIEW



Scenic Algoma

Shrimp Investigation on the South Atlantic and Gulf Coast

Natural Cycles

Published Monthly by the
DEPARTMENT OF CONSERVATION

OCTOBER
1931

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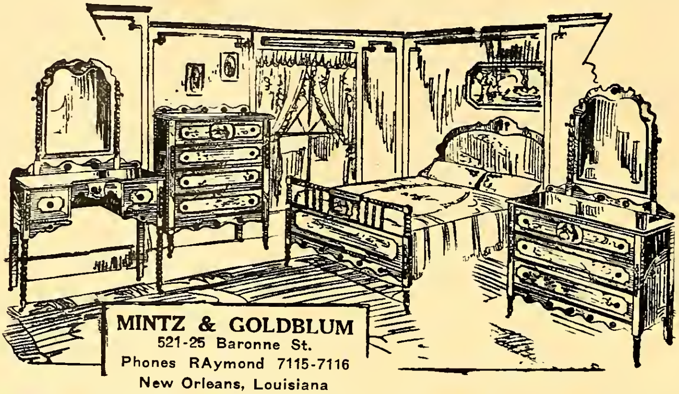

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VOL. I. NEW ORLEANS, LA., OCTOBER, 1931 NO. 13

1331

Laboratory Research Begun To Improve Fish Industries

POSSIBILITIES of adding millions to the value of the fisheries industry of the country are seen in the establishment of a new research laboratory of the Bureau of Fisheries at Gloucester, Mass., according to recent statements at the Department of Commerce. Officials foresee a further elimination of waste and improvements in fish merchandising which will add considerably to the importance of an industry already valued at $125,000,000.

J. M. Lemon, associate technologist of the Bureau, who has left Washington to take charge of the laboratory, plans among other activities a study of the temperature at which fish should be frozen, in which he will attempt to set up a standard by which fish frozen for shipment should be gauged, it was pointed out. He will also see what effect freezing has on the nutritive value of fish flesh.

The following additional information was supplied:

Tests Smoke House

A scientific "smoke-house" will be set up at the laboratory, and an effort will be made to draw up a standard smoked fish product. Smoking is now largely done by guess work, and the work in Gloucester will endeavor to supersede the old rule-of-thumb method of smoking, which entails much loss. At the laboratory Mr. Lemon will be able to control the temperature, humidity, and the time-length of the smoking process, and this will aid in establishing a "standard" quality fish product.

Another field to be entered at the Gloucester laboratory will be the study of the mold formed on some fish kept in cold storage. It may be possible that the work will include the treatment of fish with certain molds, much in the same way certain cheese is now treated in order to achieve a desired flavor. Ultra violet rays will also be utilized in the work with fish, and it is believed that irradiation will aid in keeping the fish products a much longer time.

Louisiana Conservation Review

Published monthly by the Department of Conservation in the interest of protection and proper utilization of Louisiana's natural resources.

JAMES P. GUILLOT . . . . Editor
N. E. SIMONEAUX . . Assoc. Editor
WM. G. RANKIN . . Business Mgr.

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Mr. Lemon believes, moreover, that it may be possible to bring out a spiced fish which will find favor in delicatessens.

One of the important functions of the Bureau's Gloucester plant will be the assistance it will be in a position to render in co-operative research work with the chemical and research laboratories of sea food products companies in the North Atlantic States.

Some concern is felt in the fishing industry over the depletion of fishing banks. Major researches of the Bureau are being devoted to a study of conditions, however.

With a staff of biologists, bacteriologists and chemical engineers, Mr. Lemon will endeavor to establish a closer technical control in the fish industry and will engage at once in a series of studies of scientific problems in an effort to set up improved methods of production and handling of fish products.

For the present Mr. Lemon will be in charge of three scientific research assistants. R. W. Harrison, of Washington, will supervise by-products work, such as fish meal, fish flour, and fish oil. S. R. Pottinger, of Washington, will engage in chemical analyses of various kinds. And A. W. Anderson, of Washington, will be the Bureau's fish meal, flour and oil expert. The latter has recently returned from Norway, where he had been carrying on extended investigation in these lines.

Mr. Lemon's efforts will be to improve the handling of fresh fish, including transportation, canning, smoking, salting, and freezing. Additional personnel will be added as the work progresses. Judges of the taste of the fish products turned out at the Gloucester laboratory will be the employes of the Washington bureau.

Soil Erosion Bill Is Approved by Board

APPROVAL was given by the Board of Directors Wednesday to the joint resolution of the Industrial and Agricultural Bureaus covering soil erosion in the United States.

The resolution points out that an emergency in soil conservation has arisen by reason of the unrestrained erosion that is taking place on millions of acres of land and that the problem demands immediate attention by the nation as a whole, by all the Southern States and especially by Louisiana, which receives soil washed from all parts of thirty different states. It further declares that it is recognized that forests and range cover have an influence in checking excessive erosion and that the proposal of Congressman Leavitt of Montana calling for a comprehensive study of this problem be endorsed and that he be supported and aided in his efforts to have the bill passed at the next session of Congress.

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A Little-Known Land on the Edge of Superior

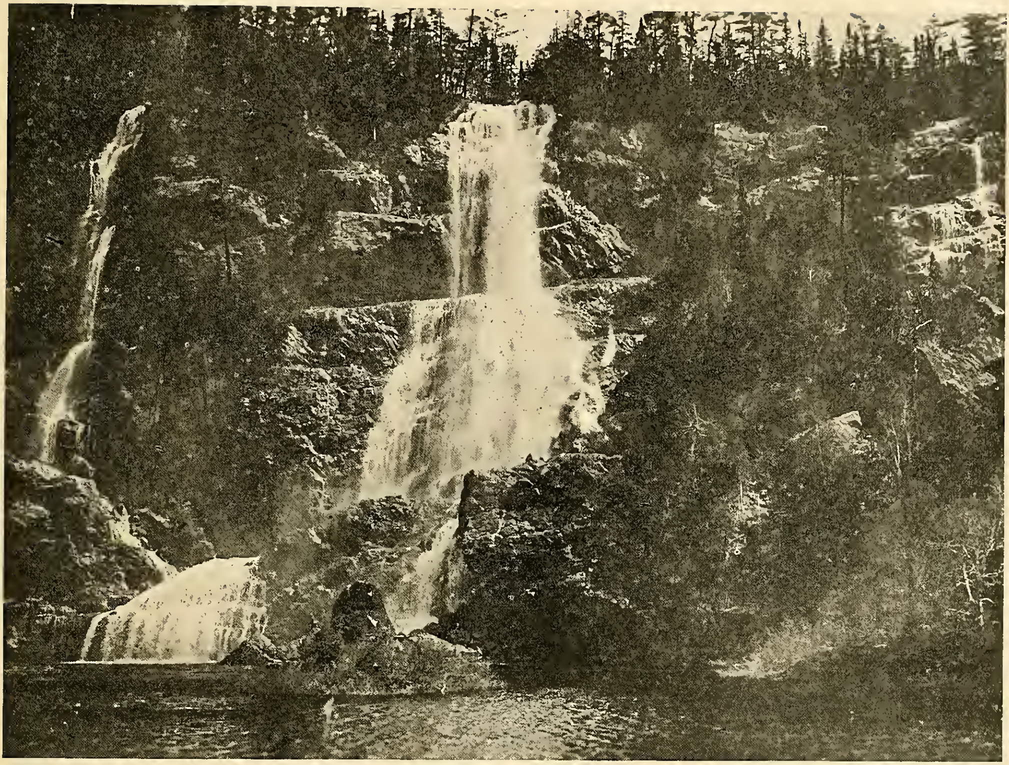
By F. A. MACDOUGALL

Who hath smelled wood smoke at twilight? Who hath heard the birch log burning?
Who is quick to read the noises of the night?
Let him follow with the others, for the young men's feet are turning
To the camps of proved desire and known delight.
—*Kipling.*

ON THE east shores of Lake Superior, in Ontario, lies Algoma. Around this land, to the south, east and north, flow great streams of tourist traffic. Up and down the St. Mary's River and through the Soo Locks pass a greater volume of tonnage than any canal in the world. On a clear day the fleets of freighters steaming over Superior resemble battleships on parade. Yet Algoma is unknown — even to Canadians.

This little-known land lies in the center of the American continent — where the Great Lakes first meet and divide again. Here lie the twin cities of Sault Ste. Marie, one American, one Canadian — so alike in interests that it has never occurred to either that its name should be changed. Within a radius of 500 miles are six of the greatest cities in North America. It is but a day's motor distance from Detroit, Chicago, or Toronto. Its very closeness to the heart of civilization has bred indifference, for people go farther afield for solitude. Algonquin Park and Timagami, with organized tourist traffic, the French River with bass and pickerel, the Nipigon with its world-famous trout, remain the lodestones that attract the fisherman and the camper. Algoma remains a wilderness, unexplored save by a venturesome few. Here is a land where the great inland sea and shore meet, where the rivers are found at the bottom of gorges hundreds of feet deep.

Indians on the Garden River—Algoma—unexplored and untraveled save by a venturesome few, remains a wilderness, where true solitude is to be found.



Perfectly named, from the train one glimpses Bridal Veil Falls in Agawa Canyon—the gorge of the Agawa River—cascading in pure white beauty over the cliffs to the river below.

Here speckled trout thrive in clear, cold water; here are thousands of square miles, unexplored and untraveled.

Here is a hardwood forest hundreds of miles north of its range—a hardy forest of maple and yellow birch. Encircling the east side of Superior, it depends upon the softening influence of the great lake for its existence. With the courtesy of nature it repays its debt by acting as a great reservoir to store, filter, and purify the water that keeps Superior unchanged. Century after century, through thousands of canyons and gorges, like a great network of arteries, it distributes water to Superior. Then the west wind, dry and strong, steals across the lake, gathers moisture and gently deposits it as mist, rain, or clouds on the hilltops to be purified and returned as water. On the hottest summer days the air is cool and moist in this northern hardwood forest.

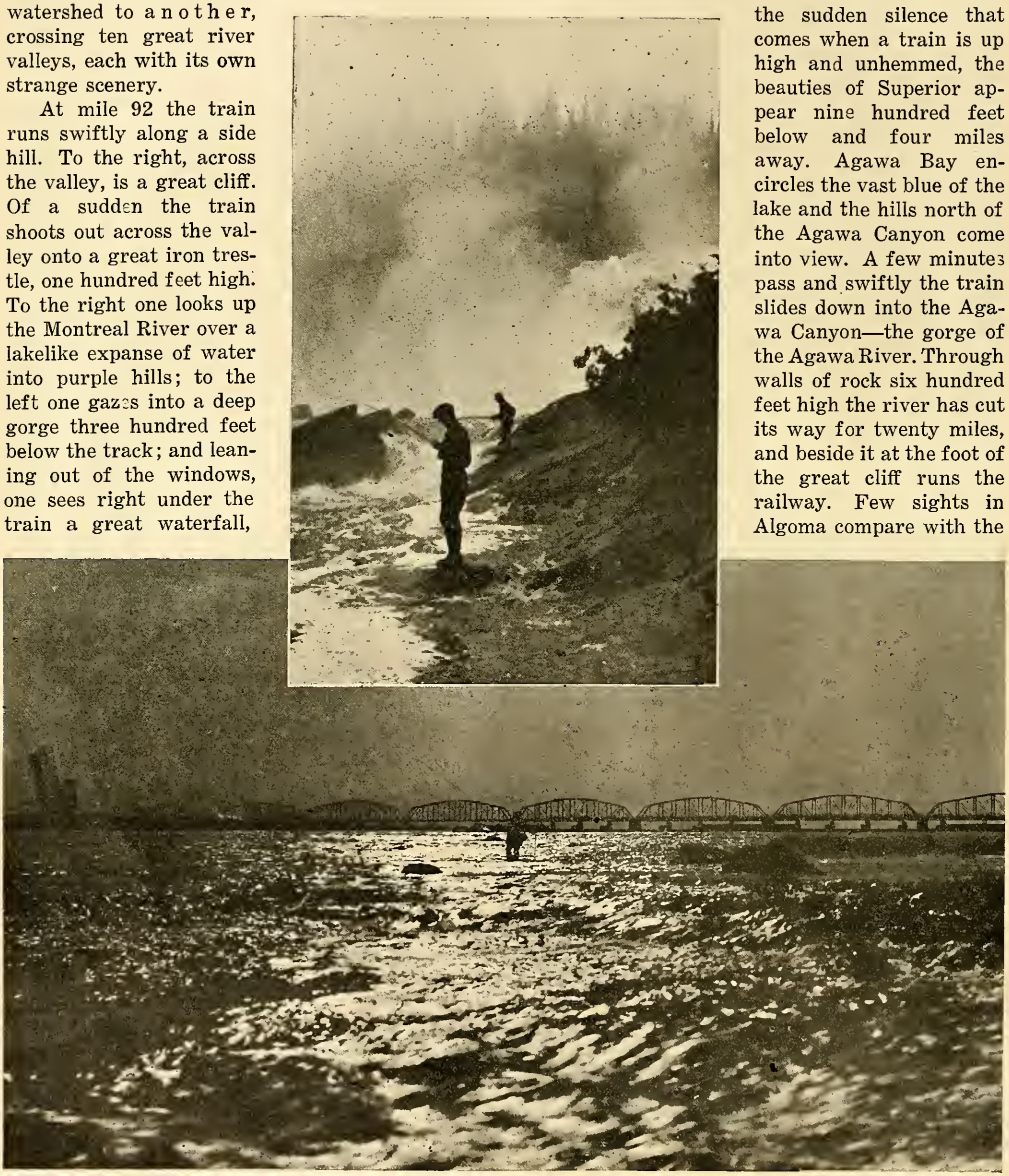
Not for many miles east of Superior does any great fire scar or mar this forest. On hilltops there are occasional small patches where lightning fires have started and burned out; but viewed from the air, the country from the Soo to Michipicoten Harbour, one hundred miles north, is carpeted with an almost unbroken covering of spruce and balsam, birch and maple. It is a contrast in colors, the light green of the hills, the blackish green of the softwood, changing in autumn to colors more fantastic than the imagination can picture. An unbelievable sight that persists for weeks. A day in Algoma's fall woods rests and exhilarates the mind as nothing else can do.

Thirty years ago an industrialist came into this land and projected a railway line north from the Soo. In the short space of 150 miles this railway, the Algoma Central, gives not only a cross-section of Algoma, but a close-up of some of its beauties. Four miles north of the Soo, it climbs up onto a high plateau. Millions of years ago this was a great mountain range as high as the Rockies, encircling Hudson's Bay like a horseshoe. For countless ages it has been scoured away. Now it is called the Laurentian Shield.

It is just a rocky plateau covered by a thin layer of boulder clay with deep, gravel-filled valleys. On the slopes of these once great mountains are storehouses of gold, silver, copper, and nickel. For two hundred miles the railway climbs up and down over this range from one watershed to another, crossing ten great river valleys, each with its own strange scenery.

At mile 92 the train runs swiftly along a side hill. To the right, across the valley, is a great cliff. Of a sudden the train shoots out across the valley onto a great iron trestle, one hundred feet high. To the right one looks up the Montreal River over a lakelike expanse of water into purple hills; to the left one gazes into a deep gorge three hundred feet below the track; and leaning out of the windows, one sees right under the train a great waterfall, eighty feet high. A second's dizziness gazing into the depths and the train is across and the view is hidden—a picture that will never be forgotten.

At mile 103 the train winds slowly out of a cut onto horeshoe fill. Amid the sudden silence that comes when a train is up high and unhemmed, the beauties of Superior appear nine hundred feet below and four miles away. Agawa Bay encircles the vast blue of the lake and the hills north of the Agawa Canyon come into view. A few minutes pass and swiftly the train slides down into the Agawa Canyon—the gorge of the Agawa River. Through walls of rock six hundred feet high the river has cut its way for twenty miles, and beside it at the foot of the great cliff runs the railway. Few sights in Algoma compare with the



A short train trip gives one not only a cross-section of Algoma—this little-traveled land where the great inland sea and shore meet, but also a close-up of much of its beauty. Speckled trout thrive in clear, cold water in rivers at the bottom of the great gorges. Climbing up and down, from one watershed to another, the train crosses ten beautiful river valleys. Suddenly shooting out onto a great iron trestle—one hundred feet below lie the shimmering waters of the Montreal River, startling in its beauty, never to be forgotten.

The lakelike expanse of the Montreal River at mile 92, and in the distance the purple hills beckon to the traveler—What lies beyond?

grim beauty of the canyon. In eight miles the railway creeps down the walls to the river bed. It takes another twenty to climb upstream and out the north end and on to Sand Lake, Anjigami Lake, and the Canadian Pacific Railway. Then north to Hearst, if one wishes, over the height of land across three continental railways and through the edge of the clay belt—the rich clay lands that once were the bottom of Lake Ojibway, a mighty lake of long ago. This is the farmland of northern Ontario.

One who looks at the canyon walls can visualize the real nature of Algoma. Deep valleys, long hardwood slopes, abrupt, conifer-covered cliffs—a mountain region in eastern Canada. It looks hard to travel, but only by traveling can one see the real Algoma. The land is safely hidden from the casual, but to the real woods traveler it reveals its wonders of scenery, fish and game.

The modern traveler may wish to sit at his ease far up in the air and see Algoma by plane, swooping down to look at some beauty spot, flying low up long river valleys or landing at a sand beach on some unnamed island lake. If so, he alone sees the long V-shaped mud trail in the lakes that denotes a moose wading out, and if he looks closer to the apex the moose itself is seen feeding on lily pads. He alone sees the mists creeping in from Lake Superior in early morn and rising over the hills, forming little cumulous clouds that float away inland. He alone sees the magic carpet of autumn woods covering thousands of square miles.

Or the modern traveler may be a boatswain and cruise along Superior shores idly resting, or landing to fish at some river. One can imagine him looking into the great hills and wondering what lies among them and beyond; perhaps regretting that life's business worries prevent him from exploring.

He may be a fisherman or a canoeist trying to cram into his short holiday enough memories of hardship to refresh the mind and revive the body for another year; (*Continued on page 9*)

A land of proved delight to the fisherman, Algoma combines river and lake scenery, rapids and still waters.

Hardwood bottoms burn readily during the dry summer and fall seasons.

(Photo U. S. Forest Service)

Cutover pine lands burned over annually. Erosion and barrenness are the results.

(Photo U. S. Forest Service)

LOUISIANA'S ANNUAL FIRE REPORT

THE Division of Forestry of the Louisiana Department of Conservation has completed its twelve months' fire fighting project through July 1, 1931. Louisiana has been very successful in the fire prevention work for this period, as only 2.2 per cent were lost in the protection unit of 5,136,840 acres. This area is under intensive protection with twenty-two lookout towers, and 2,800 miles of telephone line with two hundred and eighty telephone boxes.

The work was carried on through the summer drought of 1930 and the dry spring season of 1931. A great many fires took place from incendiarism. This one cause alone contributed to 52.6 per cent of all the fires started. The second largest factor was fires started miscellaneously and could not be classified. Otherwise, the railroads, smokers, logging engines, and others, contributed a very small per cent of causes for forest fires.

On July 1, 1930, the Forestry Division changed its system of fire prevention Up to that time the system was a forest fire fighting program. The change was as follows: All employees were placed on a yearly retainer, payable each month. Their duties were to prevent forest fires. Instead of fighting forest fires, the campaign for forest fire prevention was built up on the prevention idea, believing that prevention was far more efficient than fighting forest fires. Furthermore, that a forest fire prevention plan would eliminate

TABLE No. 1—SUMMARY OF REPORTED FIRES FOR PROTECTED AREAS IN LOUISIANA

July 1, 1930 - June 30, 1931

Protection Area	Area Protected (Acres)	Number of Fires	Area Burned (Acres)	Per Cent Burned	Average Size of Fire	Damage			Suppression	
						Timber	Other	Total	Hours of Fighting	Estimated Cost
Morehouse	149,760	82	4,977	3.3	60.7	$ 4,977	$ 437	$ 5,414	1,004	$ 310
Union	350,000	319	9,496	2.7	29.8	9,536	670	10,206	2,376	714
North Louisiana	1,800,000	790	34,330	1.9	43.6	35,347	3,171	38,518	7,710	1,913
Bienville - Jackson	600,000	378	15,662	2.6	41.4	16,961	1,338	18,299	3,654	1,089
Sabine	370,000	125	3,993	1.1	31.9	4,030	397	4,427	977	247
Vernon Lumber Co.*	18,000	5	440	2.4	88.0	440	61	501	62	19
Vernon	80,000	116	3,566	4.5	30.7	3,551	341	3,892	1,331	415
Beauregard - Calcasieu	206,000	13	137	.1	10.5	134	13	147	55	22
Allen	154,580	190	8,188	5.3	43.1	8,162	788	8,950	1,443	397
Livingston - St. Helena and Tangipahoa	690,000	334	18,737	2.7	56.1	18,943	1,793	20,736	3,257	785
Washington - St. Tammany	600,000	239	10,245	1.7	42.9	10,527	943	11,470	2,283	539
St. Tammany	100,000	124	5,632	5.6	45.4	5,618	555	6,173	666	152
St. Landry	11,000	1	210	1.9	210.0	210	21	231	45	13
State Forest	7,500	1	25	.3	25.0	25	.....	25	80	28
Totals	5,136,840	2,717	115,638	2.2	42.6	$118,461	$10,528	$128,989	24,943	$6,643

*Withdrawn January 1, 1931.

TABLE No. 2—HOW FIRES WERE DISCOVERED

July 1, 1930 - June 30, 1931

Discovered By	Number of Fires	Per Cent by Number	Area Burned (Acres)	Average Size of Fire (Acres)
Employe in Charge	946	34.8	40,346	42.6
Towerman	1,447	53.3	63,913	44.1
Other State Employe	144	5.3	4,797	33.3
Volunteer	180	6.6	6,582	36.6
Totals	2,717	100.0	115,638	42.6

TABLE No. 3—HOW FIRES WERE EXTINGUISHED

July 1, 1930 - June 30, 1931

How Extinguished	Number of Fires	Per Cent by Number	Area Burned (Acres)	Average Size of Fire (Acres)
State Organization	2,532	93.2	110,365	43.6
Volunteer	80	3.0	1,412	17.7
Rained Out	17	.6	358	21.1
Burned Out	88	3.2	3,503	39.8
Totals	2,717	100.0	115,638	42.6

TABLE No. 4—CLASSIFICATION BY SIZE

July 1, 1930 - June 30, 1931

Size of Fire Acres	Number of Fires	Per Cent by Size	Area Burned (Acres)	Suppression	
				Hours of Fighting	Estimated Cost
0- ¼	73	2.7	....	79	$ 21
¼- 10	1,071	39.4	4,852	3,987	1,090
10-100	1,315	48.4	52,056	13,478	3,548
100-500	234	8.6	41,920	6,116	1,622
500-Over	24	.9	16,810	1,293	362
Totals	2,717	100.0	115,638	24,953	$6,643

TABLE No. 5—CLASSIFICATION BY CAUSE

July 1, 1930 - June 30, 1931

Cause of Fire	Number of Fires	Per Cent by Number	Area Burned (Acres)	Damage			Suppression	
				Timber	Other	Total	Hours of Fighting	Estimated Cost
Lightning	27	1.0	2,960	$ 2,969	$ 283	$ 3,252	570	$ 168
Railroads	70	2.6	1,811	1,908	216	2,124	738	206
Campers	84	3.1	1,549	1,565	137	1,702	427	106
Smokers	290	10.7	10,068	10,346	831	11,177	2,526	679
Brush Burnings	184	6.8	5,286	5,573	451	6,024	1,598	438
Incendiary	1,430	52.6	68,385	69,733	4,381	74,114	13,173	3,458
Logging	101	3.7	4,139	4,635	339	4,974	940	242
Miscellaneous	526	19.3	21,282	21,574	1,877	23,451	4,895	1,327
Unknown	5	.2	158	158	15	173	76	19
Totals	2,717	100.0	115,638	$118,461	$ 8,530	$126,991	24,943	$6,643

TABLE No. 6—STUDY OF FIRES BY TIME OF DAY

July 1, 1930 - June 30, 1931

A. M. FIRES				P. M. FIRES			
Time	Number of Fires	Area Burned (Acres)	Average Size of Fire (Acres)	Time	Number of Fires	Area Burned (Acres)	Average Size of Fire (Acres)
1:00	6	330	55.0	1:00	624	26,830	43.0
2:00	2	505	252.5	2:00	396	14,298	36.1
3:00	4	223	55.7	3:00	309	9,551	30.9
4:00	5	305	61.0	4:00	214	6,496	30.3
5:00	4	38	9.5	5:00	80	3,145	39.3
6:00	11	750	77.3	6:00	68	2,077	30.5
7:00	11	452	41.1	7:00	53	1,563	29.5
8:00	39	1,572	40.3	8:00	24	668	27.8
9:00	71	2,936	41.3	9:00	8	1,666	208.5
10:00	192	12,304	64.1	10:00	12	702	58.5
11:00	232	12,791	55.1	11:00	5	303	60.6
12:00	206	10,322	50.1	12:00	35	1,677	47.9
Totals	783	42,528	54.3	Totals	1,828	68,976	37.7

forest fire fighting. After twelve months of demonstration, the new program has proven more than satisfactory, as the detailed statement herewith attached will show.

A great deal of credit is due the employees of the Forestry Division, who all take pride in keeping their areas free from fire.

TABLE No. 7—STUDY OF FIRES BY MONTHS IN YEAR

July 1, 1930 - June 30, 1931

Month	Number of Fires	Per Cent by Number	Area Burned (Acres)	Average Size of Fire (Acres)
July	268	9.8	10,728	40.0
August	251	9.2	12,781	50.9
September	50	2.0	1,208	24.1
October	29	1.1	478	16.5
November	86	3.2	2,370	27.6
December	38	1.4	835	22.0
January	266	9.7	8,241	39.8
February	528	19.4	29,484	55.8
March	738	27.2	34,305	46.5
April	315	11.6	10,551	33.5
May	55	2.0	1,118	20.3
June	93	3.4	3,539	38.1
Totals	2,717	100.0	115,638	42.6

	No. of Fires	Area Burned (Acres)
A.M. Fires	783	42,528
P.M. Fires	1,828	68,976
Origin hour not given	106	4,134
Totals	2,717	115,638

Comments have been received from inspectors, both Federal and from other agencies, concerning the enthusiasm which the forestry employees show in their work and the pride they are showing in the results obtained.

TABLE No. 8—FOREST TYPE

July 1, 1930 — June 30, 1931

Forest Type	Number of Fires	Per Cent by Number	Area Burned (Acres)	Per Cent by Area	Average Size of Fire (Acres)
Longleaf Pine	832	30.6	36,945	32.0	44.4
Shortleaf Pine	1,108	40.8	42.556	36.8	38.4
Mixed Pine	310	11.4	19,530	16.8	63.0
Mixed Pine & Hardwoods	449	16.5	16,183	14.0	36.0
Hardwoods	18	.7	424	.4	23.5
Totals	2,717	100.0	115,638	100.0	42.6

Further attention is called to the fact that the North Louisiana area, including Winn, Jackson, Caldwell, Ouachita, and Grant Parishes, shows 1.9 per cent burned this year. Not many years ago, this area burned over considerably each year. This area consists of 1,800,000 acres.

The Division of Forestry uses the most efficient equipment for fighting forest fires.
(Photo U. S. Forest Service)

The results of intensive fire prevention work of the Forestry Division has reflected a great deal upon adjacent lands. The lands adjoining the protected units of the State show fewer fires than in previous years. The public in general is taking an interest in the forest fire prevention problem. The Division of Forestry of the Department of Conservation is not attempting to keep the fires off all the lands in the State. The Forestry Division is only interested in preventing forest fires on the lands on which the owners are willing to cooperate and are willing to protect. Unfortunately, a great many landowners believe in burning the woods every spring of the year, believing this burning will improve the range. Although the Forestry Division does not believe in this practice, it in no way attempts to stop such practices. Any landowner who is willing to cooperate with the Forestry Division in burning his lands can have aid, so long as the landowner confines the fires within his boundary and does not let fires escape to lands belonging to others. This in itself is the forest law.

Acknowledgment is made to all public and private agencies that have contributed their cooperation in the forest fire prevention campaign.

Louisiana again has accomplished a new record, viz., protecting over 5,000,000 acres of forest land with only a loss of 2.2 per cent.

The funds used for this valuable work are obtained from three sources: Landowners, $40,537.00; State of Louisiana, $80,000.00; and, effective July 1, 1931, United States Forest Service, $52,400.00; a total sum of $172,937.00.

Forest fire protection assures Louisiana a continuous supply of timber for lumber, paper mills, and other woodworking industries, assuring our citizens continued employment in the various fields of labor. In return the State asks for cooperation in assisting in the prevention of forest fires.

SCENIC ALGOMA

(*Continued from page 5*)

and enough of solitude to rest the nerves. If so, he will launch his canoe on some inland river and pass from view around a bend into rest and quiet and meals cooked over the open fire. He can go by many routes—the Montreal River, the Sand River and the Mississagi River.

At mile 93 he starts up the Montreal River. For thirty miles east the river flows through an unlogged country. Great cliffs hem in the river valley. First, a lakelike expanse of water ten miles long, then a fast, meandering stream crossing and recrossing a wide river valley hemmed in by rocky cliffs. On the entire thirty miles there are only two short portages, the longest being twenty-five chains, then on to Tikamaganda, or Chapleau, as fancy or time dictates. There is only one bad feature to this trip—the Montreal is not a trout stream.

From Sand lake, mile 138, one can journey down a swift trout stream fifty-five miles over many portages to Lake Superior. It is a trip that gives a combination of river and lake scenery, of rapids and still waters. A sensation never forgotten is to come out over the last portage and, warm with packing, suddenly enter the cool, fresh bank of air off Superior. And then see Superior itself, perhaps calm and peaceful under a hot August sun, or a terrifying turmoil of waters in a September storm.

And so the summer passes, the cool fall days pass into Indian summer and the little ponds freeze over. Dull clouds gather from the northwest, and winter with its crisp, fresh beauty brings another change of scenery and traveling conditions. Now, when you go into the woods, the swish of snowshoes, like sandpaper on wood, makes a pleasant rhythm to break the deadly silence. The impassable swamps of summer become the first order of trails. All shrubbery is

(*Continued on page 23*)

Counting Big Game From the Air

Airplanes Used to Take Animal Census in Utah.

By NEWELL B. COOK

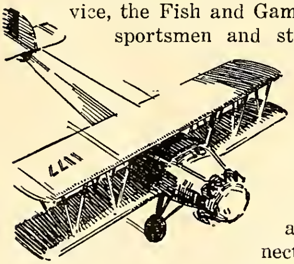
Fish and Game Commissioner,
State of Utah

THE value of the airplane in making a big game census is well proved by the results in the recent count made of the elk on Mt. Nebo. The tally was made by the Utah Forest Service and the State Fish and Game Department. It took six flights to cover an area 30 miles north and south and 18 miles east and west.

The Forest Service and the Fish and Game Department have found that the biggest drawback to proper game management in Utah is lack of authentic information about the number of wild animals on the range. While periodic estimates of game in a given area have been made the results have never been satisfactory nor have the figures been accepted as true by all concerned.

The immediate cause of having the census made by airplane was the insistence of the stockmen of that territory that the elk have increased to such numbers that they are doing great injury to cultivated lands, public range, and private range. Sportsmen and others have maintained that this is not true, and that the stockmen have exaggerated their losses. The Fish and Game Department, being financed by the sale of hunting and fishing licenses, and the National Forest Service, whose duty it is to regulate grazing on the forests, are vitally interested in getting true figures.

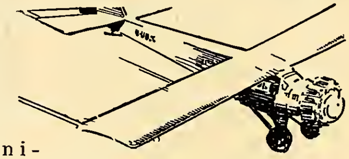
The State Game Refuge Committee, composed of representatives from the Forest Service, the Fish and Game Department and sportsmen and stockmen, made an effort to get accurate information, and Orange Olsen, former forest supervisor of the Dixie National Forest and at present connected with range management for the Forest Service, and Randall L. Turpin, a State Game Warden, were selected to do the work. After several weeks' effort to get results on the ground, these two, with the consent of the Forest Service and the Fish and Game Department, decided to try to work the census from the air.



The air count showed 351 elk on the Nebo range. This count is considerably lower than the number which the stockmen claim are there.

The men making the survey believe their findings to be quite correct and they base their argument upon the following points:

The visibility on the flights was excellent, and from an altitude of 80 feet over the mountain it was a simple matter to spot elk groups and plainly discern the individual animals. The oak bush and aspen had not yet leafed out and there was no chance for animals to be concealed in this brush.



Ground work had shown that at the time the airplane tally was being made there were very few elk in the evergreens.

Chances for drift of elk from one part of the range to another were slight, as evidenced by the scarcity of elk on the divides and the lack of unrest among the herds noticed.

Check on location of groups of elk and the number in each group tallied with information available to men on the ground.

The fliers found that early in the morning was the best time to make the flights over the mountain. Flights attempted after 9 o'clock were unsatisfactory, due to rough air conditions over the mountain. The largest herd of elk seen numbered 32; there was another group of 30; and others of 26, 23 and 18 each. The remainder were found in bunches of five or six.

The flights were made over drainage areas, since more accurate count could be made this way. The limits of the drainage area were plainly visible from the air and the divides between the watershed offered barriers against the drift of elk.

It took the men about 8½ hours to actually make the tally.

From information picked up on these flights we have come to the conclusion that the best time to count big game might be shortly after the first heavy snowfalls of the winter, say in December. The snows will drive the animals to the lower part of the range and the chances of missing stragglers and small bunches will be greatly reduced.

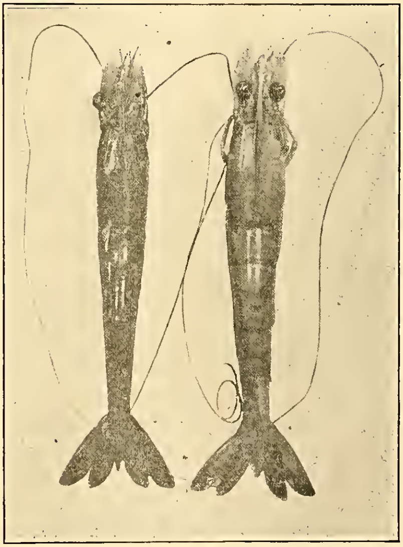
Shrimp Investigation on the South Atlantic and Gulf Coasts

Address Delivered Before the Southern Fisheries Association at the Jacksonville, Florida, Meeting July 30, 1931.

By F. W. WEYMOUTH

MR. CHAIRMAN and Members of the Southern Fisheries Association: I wish to thank you for this opportunity of discussing the shrimp investigation in which I am engaged. It has been the policy of the United States Bureau of Fisheries to study those animals which form the bases of valuable fisheries. Limitation of funds and of men make it impossible to study all, therefore selection must be made on the basis of value and incompleteness of the present state of knowledge.

I propose to outline, very briefly, why the shrimp deserves study, how the investigation has been planned and organized, what I consider the urgent biological problems in the fishery and how we propose to attack them. I shall be very glad to have you ask questions, although I will not guarantee to answer them all. I desire to learn what the questions are that you would like answered in order that our plans may be organized to include them.



Louisiana Shrimp.

The shrimp fishery in the United States is, as you probably know, concentrated in the South Atlantic and Gulf States. The North Atlantic produces a negligible amount of shrimp, the Pacific coast and Alaska rather more, but all of these contribute less than one percent of the total.

The main fishery is based on three species. Two are closely related forms, *Penaeus setiferus* and *Penaeus brasiliensis,* and the third is the not distantly related *Xiphopenaeus*. Two or three other forms are taken on the South Atlantic and Gulf coast, but are merely incidental. None of these species are found on the Pacific coast north of Mexico and there as well as in the North Sea in Europe the shrimp fishery depends on other forms. In Japan, India, Australasia, and western Mexico, however, *Penaeus* supports extensive and important fisheries.

The method of fishing has changed during the history of the fishery. The shrimp taken for private use were first taken, and in some places are still taken, by cast nets. The first fishery on a commercial scale was by haul seines, in shallow water. Later otter trawls were introduced, and now these account for about nine-tenths of the catch.

The total catch of shrimp now exceeds one hundred million pounds, ranking sixth in production and fifth in value in the United States. We have records of the total catch from 1880 to date, which clearly show the growth of the fishery. With one exception the increase has been steady and regular. This exception occurred in 1887-1890, when for four years the catch was far greater than during the years preceding or following. To this spurt Louisiana contributed over seventy-five percent.

Aside from this brief increase, the cause for which is not clear, the growth of the fishery has continued at such a rate that the yield has doubled about every eight and one-half years.

The catch in Louisiana, the largest single producer, shows a similar course with about the same rate of increase. During the time for which we have adequate records, the Louisiana production has averaged forty-three percent of the total.

It would be interesting to analyze the disposal of the shrimp catch, but data is lacking. Figures for canned and dried shrimp only go back to 1921. The canned product has been increasing steadily, though not as rapidly as the total catch. Although the price per case has fluctuated, it shows during the past ten years no distinct trend up or down.

The pack clearly follows the price; being small when the price is down. There are but few figures for the use of fresh or green shrimp and these are, I suspect, the least reliable of all. It has apparently been increasing more rapidly than the other uses but, moving in small amounts through many channels, it more easily escapes the state tax collector, and fails to appear in the record of the catch.

The figures just cited, although meager on certain important points as we shall see, are sufficient to show that the shrimp fishery is important enough to deserve investigation. Add to this the fact that practically nothing is known of the life history of the shrimp. The most completely known shrimp are those of the North Sea, two species of which have been studied by German and Scandinavian workers. But even this work is of little use to us, since the animals are not closely related to the shrimp of our waters, and are different in structure and habits. In Japan some work has been done on *Penaeus*, which is more serviceable to us but very far from complete. In the United States the habits of the shrimp are less known than those of any other animal of anywhere near equal economic value. Aside from an outline of the life history furnished by investigators of the Department of Conservation in Louisiana a number of years ago, nothing has been published, and the "filling in" still remains to be done.

Since the shrimp is both economically important and little known, the Bureau of Fisheries, when money became available, determined to investigate it. Mr. Lindner, formerly with the California State Fisheries Laboratory, and I formed the nucleus of the staff. The states in which the shrimp fishery constituted an important industry were invited to participate in a cooperative program. From most we received a cordial response. Louisiana, which, as we have seen, contributes nearly half of the catch has, employed Mr. J. N. Gowanloch, formerly of the Biological Board of Canada, as Chief Biologist, in addition to Mr. M. D. Burkenroad, who has been engaged in work on the shrimp. This state is sharing the expense of a joint program of investigation which will extend through several years. Georgia is cooperating with the United States Bureau of Fisheries in operating an experimental trawling boat out of Brunswick, under the direction of Mr. W. W. Anderson, who has been stationed there as observer. In Texas the expense of an observer, Mr. Kenneth H. Mosher, are being shared by the state. Dr. J. S. Gutsell of the Bureau of Fisheries at Beaufort, North Carolina, has been assigned to the shrimp investigation, and Mr. Gordon Gunter has recently been added to the staff of the Bureau of Fisheries as an observer in Louisiana. Much credit should go to the cooperating states for whatever measure of success we attain.

With workers in North Carolina, Georgia, Louisiana, and Texas covering the entire range of active fishing, we will be able to attack the problem on a broad front, and hope to obtain data that will throw important light on the biological problems of the fishery.

What are the important problems? As I see it the most urgent problems are involved in the life history, migrations, and depletion of the shrimp.

The life history of this species of shrimp presents peculiar difficulties. Some of the shrimps are like the crab in that the female carries the eggs attached to the legs of the abdomen or "tail" until they hatch, so it is relatively easy to determine the time and place of spawning. But in *Penaeus* this is not the case, at least no shrimp with attached eggs has ever been taken. Corresponding to the early hatching, the larvae are very small and simple in structure. These larvae, which swim at or near the surface of the water, measure only one-fiftieth of an inch or less, and hence must be hunted with special plankton nets of silk bolting.

It will be necessary to identify these larvae, distinguishing them from those of other shrimps and related crustacea, and to study their distribution in the hundred or so miles adjacent to the coast to find, if we can, where they are hatched and how they move about until, as young, they are found in the waters of bays and creeks, where, at certain seasons, they appear to be abundant. Experimental studies of the reactions of the larvae to light, temperature, salinity, and the like, will, it is hoped, explain some of the features of larval migration. The breeding habits of the adult, which also differ from those of other shrimps, are being studied. This, it is hoped, will serve as a basis about which we can organize all the data regarding their behavior.

That migrations inshore of the young occur during the life history has been suggested above and is paralleled by the behavior of two quite different European species.

Similar movements of adults have been observed at times. For example, on the 26th and 27th of June a tropical storm struck the Texas coast causing a fall of 8 degrees F. in the minimum air temperature and interrupting fishing for several days. When fishing was resumed it was found that the average size of the shrimp was larger for both males and females, the difference amounting to between one-eighth and one-quarter of an inch. Obviously larger shrimp must have entered the fishing areas, possibly in response to the temperature change.

The occurence of extensive alongshore migrations of the adult has also been claimed. On the south Atlantic the fishing season usually opens first in the south, off the east coast of Florida. As the year advances the fishing opens at points farther to the north, giving the impression of a migration north along the coast. Another explanation is, however possible. The shrimp may move inshore from deeper water, for example, as a certain water temperature is reached which will, of course, occur at successively later dates from south to north.

It is difficult to get direct evidence on this point, but its importance is readily seen. If extensive migrations occur the shrimp will behave as a unit and overfishing at one point will affect all parts of the coast. If on the other hand the movements are local only, depletion in one district will affect that region alone. This is another reason why a local investigation will not give satisfactory results, whereas a general attack over the entire range of the fishing may yield more significant information.

Migration cannot be successfully followed by tagging, because of the habits of the animal and the nature of the fishery. The most feasible method is that involving the study of races. It has been found that, when the individuals of a species are confined to a limited portion of the coast, slight but constant differences between those of one district and the next can be recognized by careful measurement. The presence of such "racial" differences would be good proof that the shrimp along the Atlantic coast did not migrate widely.

Of course our chief interest is in the supply of shrimp. A satisfactory fishery can only result where the intensity of fishing is so sanely related to the supply as to give a steady and dependable production. Overfishing will lead to a collapse of the fishery, with much loss to operators and fishermen.

We have no way of knowing the actual supply —how many shrimp there are in the ocean. We must examine the catch for biological or statistical evidence of depletion and, if these are found, give some type of protection to the shrimp. It is of course obvious that the industry cannot continue to double every eight or nine years indefinitely.

As the supply of shrimp is diminished, each doubling of the catch will require more than double the men and the gear engaged in the fishery. Whenever we find that the effort expended by the fishery is increasing more rapidly, than the total catch we must read in this fact a danger signal for the industry. And we must remember that one fisherman in a gas boat accomplishes far more than the same man in a sail boat—all improvements in boats and nets mean more intense fishing, even though the number of men remain the same. Unfortunately this is exactly the type of statistics that we lack—we have the catch for many years but the figures on men and gear only for the last two years. I would like to urge the importance of accurate statistics on the catch of this and other valuable animals. I may say that several canners have been kind enough to open their private records to us and it is hoped that by the rather tedious analysis of the catch of individual boats in the past we may be able to supply for some of the earlier years the yield of shrimp in relation to the fishing effort.

In case this or other methods give clear evidence of depletion, what measures may be taken for their protection? Those in use or proposed include the closure of areas to fishing, closed seasons, and size limits. It is desirable to adopt such measures as will afford protection with the minimum of interference with the industry and difficulty in enforcement. Possibly this could be effected by such a modification of the gear as would permit the escape of the smaller shrimp. Experiments to analyze the nature of the catch in relation to the gear are now in progress.

There seems to be at this time no cause for alarm, and I see no reason that, armed with more information concerning the shrimp's life history and habits, we should not be able to forsee depletion before it becomes acute, and offer the protection necessary to stabilize a valuable fishery.

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Natural Cycles — A Mystery of Life

By PROFESSOR J. N. GOWANLOCH
Chief Biologist, Research Bureau,
Department of Conservation

WHY are there plagues of mice in some years and a scarcity of rabbits in others? Where has our old-fashioned weather gone?

Few aspects of life are more interesting or more mysterious than the existence of various kinds of cycles in abundance of animals, in crops, and in weather. Everyone is familiar with the Old Timer who says "We never get the winters now we used to get. Why when I was a boy—".

I believe it was Roger Bacon who long ago thought he had found a thirty-five year cycle in the English weather.

Mouse plagues have long been striking examples of biological cycles whose causes remain obscure. The appearance of hordes of meadow mice has somtimes been so sudden as to be regarded as miraculous. The Bible records such spectacular upwelling in numbers, and in the works of Herodotus and Homer are found references to mouse plagues during the Trojan war. So important did the Greeks regard these events that they incorporated in their theology a mouse god, sacrifices to whom were believed to avert such plagues.

The quaint language of the early English writer, Holinshead, tells of one such visitation; "about Hallontide last past (1581) in the marshes of Danesey Hundred in a place called South Minster in the County of Essex...there sodainlie appeared an infinite number of mice, which overwhelmed the whole earth in the said marshes, did shear and gnaw the grass by the roots, spoyling and tainting the same with their venimous teeth...which vermine by policie of man could not be destroyed till at the last it came to pass that there flocked together such a number of owles ...whereby the marsh holders were shortly delivered from the vexation of the same mice..."

In 1900 a mice plague occurred throughout the vast territory of Alberta and central Saskatchewan between Edmonton and Athabaska Landing. In 1907 the Humbolt Valley, Nevada, was struck by a plague of such magnitude that on the large ranches the numbers of mice per acre ranged from 8,000 to 12,000. Orchards were destroyed, young shade trees girdled and even the large lombardy and silver poplars were killed by these tiny animals. Fifteen thousand of the twenty thousand acres of alfalfa in the lower part of the valley were a complete loss. As in other such plagues, the suddenness of its beginning was matched only by the suddenness of its end. Predatory birds and mammals, depleted food supply, and above all, disease, swept away the teeming population so that within a matter of months the plague had passed.

A biological conference of extraordinary interest was held this summer during the last week of July for the sole purpose of presenting and discussing the evidences of natural cycles. So interesting were its results, and with such obvious bearing upon conservation problems, that some account of its content and findings is here given.

The conference was called by Mr. Copley Amory of Boston and was held at a remote place, his summer home at the mouth of the Matamek River on the northern side of the Gulf of St. Lawerence, 300 miles east of Quebec. The thirty participating scientists were all Mr. Amory's guests. An ardent sportsman, Mr. Armory had long been interested in the fact that sometimes the fish, birds and mammals were very abundant and sometimes, for no apparent reason, very scarce. The official report of the conference, prepared by Professor Ellsworth Huntington of Yale University, has been published in *Science* (Sept. 4, 1931). From this report the following materials are summarized.

The conference considered all kinds of cycles —fluctuations in trees, insects, fish, game birds, mice, rabbits and even financial panics, cycles varying in length from thirty months to 260 years. It has been long known that there exists an eleven year cycle in sun spots which Julian Huxley, Elton, and others have believed to be a controlling influence on weather and through weather on animal life. Elton states that "the sun varies about five percent in output of energy and this variation has been definitely proven to affect the earth's climate". Huxley states "the yearly path of storms varies with the sun spots returning to the same area about every eleven years. This has, too, been correlated with a change in total precipitation, affecting most strikingly the animals and plants of semi-desert regions."

It is extremely interesting that contrary to expectation the conference found that its interest did not center around this sun spot cycle of eleven years, but around two shorter cycles, one of four years and a more important one of between nine and ten years. Professor A. G. Gross of Bowdoin

College, described the definite four year cycle in the migration of snowy owls into New England. Elton discussed a four year cycle in far northern mice, lemmings and Arctic ptarmigan. He stated that in Norway, where lemming migrations have been recorded for hundreds of years, the same cycle is demonstrated. In Alberta, Professor Rowan showed a four year cycle in mice and shrews. "The regular course of events seems to be that the mice, lemmings and ptarmigan increase enormously in numbers for a season or two. Foxes, owls and other creatures are thus provided with abundant food. They, too, increase so fast that the number of skins brought into the Hudson's Bay Company may be many times as great at one phase of the cycle as at another. Then there comes a change so sudden that the members of the conference call it the 'crash'. The rodents and game birds begin to die by the thousand or million. Some of them, such as the lemming, also migrate long distances, only to meet death in some other region. The creatures that have been feeding on them soon become hungry. They, too, begin to die, or else migrate to even greater distances".

The most remarkable of all was the accumulated evidence of a nine or ten year periodicity. Aldo Leopold of Wisconsin described such a rhythm among the grouse and rabbits in Wisconsin and neighboring lake states. In Alberta, Rowan found an almost ten year cycle in grouse, some other non-migratory birds, rabbits, coyotes, and other furbearers. Farther north in Canada, Elton, using the voluminous records of the Hudson Bay Company, has found a cycle exactly nine and seven tenths years long in the abundance of hares, muskrats, grouse, lynxes, red-fox, marten, wolves, mink, and goshawks. Most impressive is the fact that not only do many different animals share this periodicity, but the same period occurs over the continent form the remote Canadian northwest south into the United States. The fluctuation seems to begin in the far north and works its way southward and eastward, reaching southern Canada three years after making its appearance in the north. Nevertheless, in any given region the period remains constant.

The records of sport fishing and the commercial catch of salmon provided remarkable facts.

"Still more astonishing are the results of Dr. A. G. Huntsman, of Toronto University, Prof. E. B. Phelps, of Columbia University, and Prof. D. L. Belding, of Boston University Medical School. Using the records of the commercial catch of salmon in the bays along the coast of New Brunswick, Dr. Huntsman found indications that the salmon come and go in periods of nine and six tenths years. Professors Phelps and Belding used the very careful records of the salmon caught by the members of the exclusive Restigouche Club on the Restigouche River in New Brunswick. Each fisherman there religiously records the weight and size of his fish and the number of days spent in fishing. Thus it is easy to calculate the daily number of fish per rod or angler for each of the last fifty years. There, too, the fish appear in great abundance every ten years, but sink to smaller numbers in the interim. Curiously enough, it is not because large or small numbers are hatched in special years, although such may be the case. The greatest immediate cause of the change in numbers from year to year appears to be something which happens when the smolt, or young salmon, enter the sea."

The extensive area involved in these cycles is astounding. "From far away on the other side of the continent the measurement of the annual rings of the giant sequoias of California, by Dr. Ellsworth Huntington, of Yale University, supplies still another type of evidence of this same cycle of about ten years. Thus once in ten years or less something seems to happen which causes an increase and then a decrease in the vital activities of both plants and animals. This occurs all over North America from the borders of Alaska to the Maritime Provinces and the northern United States, and also in the adjacent seas. Then, to complete the picture, Mr. Comsia, from Rumania, stated that he, too, has found some evidence of the ten-year cycle of disease in the rabbits, not only of Canada, but possibly of Europe. The European disease is coccidiosis, which may turn out to be an important disease in Canada. Scraps of evidence such as locust migrations suggest that this same cycle prevails over still wider areas."

The known sun spot cycle of eleven and one-fifth years played in the proceedings, as has been said above, much less part than was expected. However, Dr. H. Mayer-Wegelin, of the German Forestry School of Munden in Hanover, described an eleven year cycle in the growth of German trees, while his colleague, Dr. H. S. Eidmann showed that insect pests of German forests appear to have a cycle of about twelve years. D. R. Cameron, of the Canadian Forestry Branch, pointed out that this cycle might be due to human influences. The detail studies presented by the conference members suggested that many of the eleven and twelve year cycles may fit equally closely into cycles averaging nine and one-half years.

That the weather, the moon, and the tide, may play some part in these affiars of man and animals is much less mystical than would seem at first glance.

"One curious thing about this nine and one-half cycle is that while it can be detected in meterological records, it has not been much studied there. Moreover, no basis for it, such as sunspots, has yet been found. Mr DeLury pointed out that it is a little longer than the lunar cycle of eight and eighty-five one-hundredths years and almost exactly half of another lunar cycle of eighteen and six-tenths. These two cycles of tidal activity may influence climate by stirring up the ocean waters, allowing cold water to come to the surface, and thus influencing atmospheric pressure and storms. This is not clear, however, and the conference felt that much more evidence was necessary before so seemingly minor a cause could logically be connected with such great events."

Financial panics, the abundance of salmon and rabbits, all these show striking regularity, although the solution of their cause and the attempt to relate them to some common world influence is as yet almost hopeless. "The magnitude of the action of these cycles is still more evidence from certain facts pointed out by Dr. Huntington. He showed that the most distinct cycle of droughts and of agricultural productivity in the United States has a period of sixteen and six-tenths years if measured by the five cycles between 1837 and 1930. Moreover, during that same time there have been six financial panics separated by five average periods of eighteen and four-tenths years. The panics, curiously enough, go with the agricultural depressions, but may precede or follow them. This suggests that the panics and the droughts may owe something to a common cause, even though the agricultural depression resulting from the droughts may not be the immediate cause of the panics. The conference made no attempt to solve such problems as this. It was, however, impressed by the fact that droughts, panics, and agricultural depression, not only show greater regularity than the sunspot cycles, but seem to have a periodicity twice that of the very regular cycles found in sequoia trees, rabbits, grouse, foxes, salmon, and many other animals."

The existence of long cycles is much harder to prove because of the rarity of available long period records. Some, however, were indicated. "Dr. Edimann thinks that the noxious insects in the forests of Germany wax and wane in cycles of about thirty years. Professor Rowan finds a cycle of 34 years in the ducks, crows, magpies, and lake levels of Alberta. The Bruckner cycle of 30 or more years is also found by Mr. DeLury in several series of meterological data and in the growth of trees. The salmon statistics studied by Professor Huntsman seem to show a cycle of 48 years. Still longer cycles are suggested by the rings of growth of trees, but these fall beyond the scope of the present conference."

To sum up the cycles demonstrated "There is fairly abundant evidence as to a four year cycle, the length of which seems to be almost exactly four years. A cycle of six years is suggested but not confirmed. A cycle of between nine and ten years, on the other hand, is very strongly indicated. It is often called a ten-year cycle, but the most accurate determinations suggest that the true length is nearer nine and one-half years. A cycle of perhaps eighteen and six-tenths years appears to be at least as widespread and definite as the four-year cycle. As to the larger cycles no data for gauging their importance were forthcoming at the conference."

Such are the cycles, mysterious yet real, evident yet unexplained. What then may we surmise is their cause? Is it an influence originating in some restricted place? Evidently not, for they are too far spread. Is it some world-wide causation or is it some influence from outside the world, some change in moon or sun? Such views that would, not very long ago, have been regarded as fantastic must now in the light of evidence be seriously and scientifically considered. "The causes of cycles in animals appeared to the conference to be divided into three groups; biological, meterological, and astronomical. The first includes food, reproduction, parasitic insects, diseases, especially those of bacterial origin; the second, or meterological group, needs no definition; the third group may be briefly discussed before we turn to the others. It was dealt with chiefly by Mr. DeLury. He holds that the chief causes of climatic variation are partly solar and partly lunar. The conference seemed to feel that while terrestrial climatic fluctuations are probably due to solar variations, such fluctuations are probably due to other astronomical causes as well as to the variations which manifest themselves as sunspots. One of the strongest impressions of the whole conference was that all sorts of cycle phenomena must be controlled, though not necessarily caused, by some outside forces, which dominate all forms of life. If these are solar forces they manifest themselves as sunspots, prominences, faculae, the solar constant, electro-magnetic activity, and perhaps still other phenomena. These presumably lead to both meteorological and organic phenomena on the earth. If the lunar forces have any effect in producing cycles, they presumably act through the tides, which in turn gives rise to oceanic currents and upheavals of cold water from below. These are supposed to alter the atmospheric pressure and thus cause winds, storms, rain, and changes of temperature."

One result, valuable, and to be secured only by the wide nature of such a conference as that at Matamek, is that the scientist becomes less likely to overemphasize the casual effects of simple details in the enviornment and sees more clearly the broad picture. Thus while in many of the demonstrated cycles their spectacular rise and crash is clearly due immediately to food supply, that fluctuation in food supply is itself the result of other broader causes. "No one at the conference seemed to entertain much doubt that migrations of animals and variations in their numbers are often due to the food supply. Some of the most clear-cut examples are the migrations of the snowy owls when the supply of mice runs short after a period of great abundance. It is almost equally clear that the extraordinary variations in the numbers of rabbits, muskrats, and other rodents from one extreme of the ten-year cycle to the other are one of the main causes for variations in the numbers of foxes, lynxes, mink and other fur-bearing animals. Mr Elton's curves showing the numbers of skins of such animals brought in to the Hudson's Bay Company posts give good indication that the ups and downs of the furbearers follow closely on those of their prey, although the maximum number of the furs of carnivores is brought into the market a year after the maximum of rabbits. It was also made clear by various members of the conference that sea animals wander about in huge numbers in response to variations in their food supply. One of the most interesting of such wanderings is the migration of the sperm whales described by Dr. Charles Townsend of the New York Aquarium. The small crustaceans and other minute forms of life upon which these huge animals feed are abundant only in summer. Therefore, in order to obtain the barrels and barrels of food which form their meals, the whales each year wander back and forth over routes six and eight thousand miles long. During our summer they are in the northern hemisphere, and during the southern summer in the southern hemisphere."

Phases other than food supply which have never adequately been considered were indicated, such as the rate of reproduction of the species. Elton showed that the number of young snowshoe rabbits and certain other animals born in the average litter apparently tend to increase in certian years and to decrease when scarcity of food and other causes lead to a reduction in the numbers of animals. Huntington showed that even in man the rate of reproduction is closely correlated with climatic conditions. Thus "a rapidly increasing race like the Japanese would decline in numbers if the relative rates of deaths and of conceptions resulting in living births stayed steadily at the levels of September, when health and vigor are at a minimum. Professor Rowan presented experimental evidence suggesting that the same thing is true among birds. By altering the conditions of light and temperature he has induced birds to breed in mid-winter. Dr. Kyle and Prof. Huntsman made it clear that reproduction in fish and other sea animals responds with equal readiness to changes in temperature."

The enormous effects of parasites was made clear in a wide series of such cyclic studies. Although the layman little realizes it, no species lives unti itself alone. Its success is the composite result of influences operating indirectly upon itself and of influences acting indirectly upon it, through the parasites that impair its vigor and the plants or animals that form its source of food.

A disease sometimes fatal to man and yet discovered within only the past few years and to which the name of tularaemia has been given, was found by Professor R. G. Green, of the University of Minnesota, to play an important part in the cycles of abundance of rabbits and grouse. He demonstrated clearly that during the last rabbit cycle in Minnesota the "crash" when the animals suddenly died off was due to a very virulent form of this bacterial disease. The disease is carried by ticks, which also infest grouse. Professor Green's findings have resulted in the theory that when the rabbit population begins to decline the tularaemia bacteria are extremely virulent, while the proportion of old and immune rabbits is very small. Hence millions of rabbits die, for the mortality is almost one hundred per cent. The ticks which they carry fall to the ground, but soon find new hosts in other rabbits and grouse, thus spreading the disease. For some unknown reason, however, the virulence of the tularaemia bacteria decreases rapidly. After the epidemic it becomes so low that as young are born from the surviving rabbits they do not die from the disease, but have a non-fatal form of the disease which makes them immune. Thus there arises a group of immune rabbits, some of which survive the next epidemic and carry on the race. In tularaemia the parasitic bacteria are so virulent at the time of their main onset that practically all affected animals die, no matter how strong they may have been. Such facts as this precipitated a lively discussion as to the relative importance of changes in the virulence of the parasites compared with changes in the degree of resistance of the host. The conclusion seems to be that there is no general rule. Under

(*Concluded on page 35*)

FUR FARMING THRIVES IN EUROPE AS WILD ANIMALS FACE EXTINCTION

Beasts Raised in Captivity May Soon Have to Fill Entire Demand of the Market, Says Consul at Milan.

THE probability of extinction of many of the wild fur-bearing animals, requiring those raised in captivity to fill the demand for furs, together with the increasing demand for fur, adds promise to the fur raising industry in Europe, according to a report received by the Department of State from Josefa Otten, or the American Consulate at Milan, Italy, and made public June 26.

That part of the report made public by the Department of State follows in full text:

During recent years the raising of animals for fur has assumed substantial proportions in various European countries and is now making its influence felt on the world's fur markets.

The industrial crisis and the fight for existence, which becomes harder and harder, have rendered people eager to adopt new pursuits, but every prospective fur farmer will ask himself: "Will I be successful in disposing of the young animals profitably as soon as they are in condition to be sold?" To this it may be replied that there will surely be a great demand for live animals for many years to come, since this new industry is in its first stages in Europe.

Otter country in Natchitoches parish.

Furthermore many of the wild fur bearing species are subject to such continual hunting that they will probably soon become extinct, and animals raised in captivity will then have to fill the entire demand of the fur markets. Thus the new industry may face the future without fear, since the world consumption of furs is steadily increasing.

The governments of various European countries were quick to recognize the possibilities of the fur farming industry and to grant facilities to further it, such as exemption from taxes, distribution of specimens from good stock for experimental purposes, etc. The animals which seem to adapt themselves best to European conditions are karakul sheep, foxes, minks, and coypus.

The original home of the karakul sheep is Buchara in Asia, now belonging to Soviet Russia, where they range on the immense steppes, exposed to all the inclemencies of the weather. It is probably for this reason that they are so very hardy.

Although used to feeding on the salty grass of the Asian steppes, they have become accustomed to other nourishment and are being raised with good results in Germany, France, and Switzerland; even Italy is experimenting with them now. As a rule, only black karakul sheep are being raised on this continent. The experiments made with brown and gray specimens have not yet shown definite results.

Black karakul sheep have been raised in Germany since 1903, and have shown that they retain all their natural characteristics. One of these is the peculiar S-shaped tail, so vital to the animals in their unsheltered outdoor lives on the Asian steppes, because its surplus fat is absorbed by their systems in times when no food can be found, but which serves no purpose to animals regularly fed in captivity.

Black karakul rams have been successfully crossed with white domestic ewes. The strain of the first is so strong that lambs of the first generation are born black and show greater resemblance to their sires than to their dams. These halfbreeds are crossed with pure-bred karakul sheep. Animals of the third and fourth generations, obtained in this manner, still have the S-shaped tails, can hardly be distinguished from purebred karakul sheep, and supply excellent furs.

It is of interest that the rams of the fourth and fifth generations have been satisfactorily used as first sires on newly founded establishments and crossed with domestic ewes. The chief aim in raising karakul sheep is, of course, to obtain as perfect specimens as possible, and it appears that this question has been solved in Europe.

The raising of silver and blue foxes has given good results in Europe, but only in places situated at least 2,650 feet above sea level. Prices for the furs keep well up on the international markets. Foxes are kept in pairs in wire net cages of 33 x 18 x 7½ feet. Each cage contains a box about one yard square containing a bed of straw.

Their food, given twice daily, consists of meat, fruits, vegetables, and cereals. The cost of maintenance of a pair of foxes with their young raised in the course of a year amounts to about It. Lire 1,500 to 2,000 ($79 to $105) yearly. As a rule they have from two to five young per year. When these are 10 months old, their furs may be used or they may serve for breeding purposes.

Some experience is necessary to raise foxes successfully. However, they do not cause much work. The main factors are cleanliness and order. If these are observed, illness and accidents will doubtlessly be avoided. Most European fox farms accept paying pupils, who may stay for the length of time necessary to learn how the animals should be kept.

Minks in Demand

These small animals, whose soft fur is so valuable and so greatly in demand, were brought to Europe only in 1926. In spite of that, there are now many farms on this continent, on some of which as many as 500 to 1,000 animals may be found at a time.

The minks, originating from North America, have adapted themselves well to life in captivity here. Their length is about 24 inches, including their bushy tails, and their weight up to two pounds. If these hardy animals receive the necessary care, they are not liable to fall ill. They are very lively and intelligent creatures, respond to good treatment, and are apt to become very sociable.

It was at first believed that they could be raised only in cold northern climates, but experience has shown that they endure the heat and the cold equally well, thriving even during the heat of Italian summers, provided they always have fresh water to bathe in. They are excellent swimmers and enjoy staying in the water for long periods.

No great capital is needed to raise these animals and they do not cause a great deal of work. One person can easily attend to 500 animals. They need little space, but owing to their rapaciousness, they should be kept separately, or at the most in pairs, and this only during breeding time.

The cages are generally about 7½ x 4 x 2½ feet and are made of iron bars covered with wire netting of one-inch mesh. For reasons of cleanliness they are portable. Each cage contains a box with hay to which the animal retires.

In summer each cage should be equipped with a round basin, about 20 inches in diameter and 10 inches deep, for fresh water, which must be changed frequently. Some shady spot should always be provided for. Such cages cost very little, and can easily be constructed on the farm itself.

Food is inexpensive. Minks are carnivorous animals and eat any kind of meat except pork. Besides, they are very fond of fish. The meat is given them raw, mixed with uncooked cereals, vegetables, etc. The daily ration for each animal is about 120 grams. Usually they are fed twice daily as it is healthier for them to receive small quantities at a time.

Minks have about two to eight young a year, an average of four yearly. The mother attends to the little ones carefully, but after two months they are taken away from her and each placed in a separate cage. When three or four months old, they have reached their full size. They may be killed at six months old or, if preferable, they may be used for breeding purposes at the age of one year.

Chief Forester Approves 28 "Primitive Areas"

Twenty-eight mountainous areas in the national forests have been set aside by the United States Forest Service as "primitive areas," to be devoted to the use of those who prefer their outings in virgin wilderness, under living conditions approaching as near as possible those encountered by the explorers and pioneers of past geneations. A number of additional tracts also are being studied, and the Forest Service's primitive area system eventually will embrace suitable areas for purposes of public education and recreation, within the national forests in all major forest regions of the United States.

Adapted for "roughing it," these areas will be kept free from highway development and will usually be penetrated only by forest trails. Many of them are alpine in character, rich in scenery, but of limited economic possibilities. Game and fish are plentiful in most of the areas.

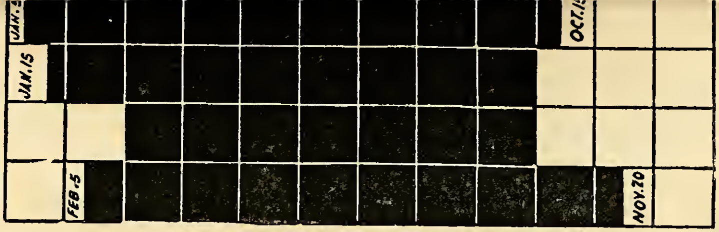
Sixteen of the primitive areas, already approved by the Forester, lie in California, four in Oregon, three in Washington, two in Montana, and one each in Idaho, Utah, and New Mexico. Their aggregate area to date is 4,056,733 acres.

Louisiana Fur, Game, and Fish Laws, 1931-1932

■ BLACK SQUARES DENOTE CLOSE SEASONS □ WHITE SQUARES DENOTE OPEN SEASONS

NUMBERS IN SQUARES ARE OPEN DATES

MIGRATORY GAME BIRDS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	BAG AND POSSESSION LIMITS
WILD DUCKS Except Wood Duck	□	■	■	■	■	■	■	■	■	■	16	15	15. daily, 30 in possession at one time.
WILD GEESE	□	■	■	■	■	■	■	■	■	■	16	15	4 daily, 8 in possession at one time.
COOT (POULE D'EAU)	□	■	■	■	■	■	■	■	■	■	16	15	25 daily, 300 season.
SNIPE	15	■	■	■	■	■	■	■	■	■	□	□	20 daily, 240 season.
DOVE *	□	■	■	■	■	■	■	■	■	■	■	□	25 daily, 300 season.
WOODCOCK	■	■	■	■	■	■	■	■	■	■	■	□	4 daily, 22 season.
RAILS	□	■	■	■	■	■	■	■	■	■	□	□	25 daily, 300 season
GALLINULES	□	■	■	■	■	■	■	■	■	■	□	□	15 daily, 300 season.
SORA	□	■	■	■	■	■	■	■	■	■	□	□	25 daily, 300 season.
RESIDENT GAME BIRDS													
BOB WHITE (Quail or Partridge)	□	FEB.15	■	■	■	■	■	■	■	■	■	□	15 daily, 120 season.
WILD TURKEY	■	■	MAR.5	APR.5	■	■	■	■	■	■	■	■	1 daily, 5 season.
GAME ANIMALS													
DEER*. Northern Zone	JAN.15	■	■	■	■	■	■	■	■	■	■	□	1 daily, 5 season.
DEER* Southern Zone	JAN.5	■	■	■	■	■	■	■	■	■	□	□	1 daily, 5 season.



BEAR	1 daily, 5 season.
SQUIRRELS	10 daily, 120 season.
RABBITS	No limit, may be sold in open season.
FUR ANIMALS Muskrat, Mink, Opossum, Otter, Raccoon, Wolf, Fox, Skunk, Etc.	Trap limit 250, traps must be visited daily.

***DEER ZONES.**—**Northern:** Concordia, Avoyelles, Rapides and Vernon and All Parishes North.
Southern: All parishes south.

HUNTER'S LICENSE PROVISIONS

LICENSE YEAR JULY 1 TO JUNE 30

HUNTING LICENSES:

Residents, all game birds and animals	$ 1.00
Non-residents, migratory game birds only	$25.00
Non-residents, game birds and animals	$50.00

TRAPPING LICENSE:

Residents only, does not allow hunting, good only in parish where trapping is done	$2.00

FISHING LAWS

FRESH WATER GAME FISH

KINDS	Size Limits	Creel Limits
BLACK BASS (green trout)	10 inches or more	20 daily
YELLOW BASS (striped bass)	7 inches or more	25 daily
WHITE BASS (barfish)	7 inches or more	25 daily
CRAPPIE, (White perch, speckled perch, sac-a-lait)	7 inches or more	25 daily
SUNFISH (perch, bream, goggle-eye, blue-gill, etc.)	5 inches or more	100 daily

CLOSE SEASONS AND CLOSE ZONES

No state-wide close seasons on game or commercial fish. Department of Conservation can authorize close seasons or close zones in any waters where necessary, otherwise fish can be taken at any time or place provided size limits and other restrictions are observed.

ANGLER'S LICENSE PROVISIONS

LICENSE YEAR JANUARY 1 TO DECEMBER 31

Resident, per annum	$ 1.00

Required of all anglers fishing for fresh and salt water game fish with rod and reel, artificial baits, spinners, or live natural baits. No license required when using dead natural bait or worms, grubs, clams, and mussels on ordinary pole and line.

Non-resident, per annum	$ 5.00
Tourists or transients limited to 7 consecutive days	1.00

Required of all non-resident anglers fishing for fresh and salt water game fish, irrespective of tackle or bait used.

ISSUED BY **DEPARTMENT OF CONSERVATION**
ROBT. S. MAESTRI, COMMISSIONER
NEW ORLEANS COURT BUILDING, NEW ORLEANS
TELEPHONES MAIN 1914-1915-1916

□NOTICE—Federal Bag Limit of 15 ducks and 4 geese daily must be observed.

* Dove Season in Louisiana: December 1st through January 31st must be observed as only open season.

Industry's Dependence on Mineral Products

Manufacturers of Chemicals Included in Enterprises Aided by Research Work of Geological Survey

By ROGER C. WELLS
Chief Chemist, Geological Survey, Department of the Interior

THE goods that supply the complex needs of our present economic life—aside from foods—are so obviously products of manufacture that many people overlook the raw materials altogether. But going back far enough one comes finally to some product of mother earth—a mineral in the broadest sense.

Power is produced mainly from fuels, structural materials from rocks and ores, machines from metals, and drugs, pigments, and fertilizers from various nonmetallic minerals. Some mineral commodity lies back of, or assists in the preparation of practically every manufactured article.

The United States Geological Survey explores the original sources of these commodities, describes their occurrence, and seeks to explain their origin. Such information is a guide in locating the new deposits that must continually be developed to maintain the steady flow of raw materials, or—what is equally important—it saves many a fruitless search in unprofitable territory. This is a very different matter from merely cataloging mines.

The science of geology is concerned with the history of the geologic periods during which the sedimentary rocks were formed, with the phenomena attendant on volcanism and the discharge from deep sources of the igneous rocks with which many ore deposits are associated, with the age of minerals, with the origin and flow of heat in the earth, with the chemical changes involved in the weathering of rocks and the formation of new minerals, in short, with all the changes that have taken place in the crust of the earth in the past, as well as those going on under our observation at the present time.

A Division that has been increasing in importance rather rapidly in recent years deals with water alone, the many uses of which are familiar to everyone, but the economic value of which to large communities is seldom appreciated. Water often represents the grim choice between survival or death to whole communities. Its use for power is also important, Both for power itself, and for light, heat, and the source of energy in the electrochemical industries. The geologist is thus called on to study the role of water above ground, under ground, in the air, and in vegetation.

The extent to which mineral products enter into industry is indicated by the fact that raw mineral products constitute more than half the freight handled by the railroads of the country. The chemical industries all draw on natural products for their basic materials. Sulphur is an extremely important element in this regard. It is converted into sulphuric acid, which is used in almost every chemical industry, directly or indirectly. Ordinary salt is converted into a number of other sodium compounds, such as alkali and soda, which are used in making soap, glass, dyes, and many other chemical products. Some natural sodium compounds are used directly in the industries, but most of them must be refined.

Recent explorations by the Geological Survey and the Bureau of Mines in Texas and New Mexico have led to the discovery of potash resources that give promise of equaling those of France and Germany. An indication of potash was first noted in western Texas in 1911, in water from a boring at Spur, Dickens County, from a depth of about 2,200 feet, as a result of tests suggested by J. A. Udden, of the Bureau of Economic Geology of Texas. In 1921 this Bureau and the Federal Geological Survey cooperated in collecting material from deep borings in western Texas, which showed potash over a considerable territory.

The principal potash mineral was that year identified by R. K. Bailey, a chemist in the Survey, as the sulphate mineral polyhalite, which carries about 16 per cent of potash, and Congress appropriated money to be spent for boring test wells at points to be selected by the Survey. Beds of polyhalite were found at successive levels in some of these wells, and in others which were drilled by private companies either in prospecting for oil or commercial deposits of potash minerals.

The Geological Survey has made many thousands of chemical analyses and petrographic identifications in the search for potash. In material from Eddy County, southeastern New Mexico, a chloride potash mineral, sylvite, was discovered in 1926. Langbeinite and kainite were also identified in this material. The sylvite is now being mined and shipped by the United States Potash Co., from its mine near Carlsbad, N. Mex., in material averaging 25 to 30 per cent of potash as mined. It is used by the chemical and fertilizer trade.

Although the country is very rich in many mineral resources it is not so well off in a few substances. Tin, manganese and platinum are more abundant elsewhere. On the other hand there are some minerals that are naturally scarce everywhere. Beryllium could undoubtedly be used extensively if it were more common. The Geological Survey is constantly studying possible sources of supplies of such elements. Its investigations take the field men from Florida to Alaska and keep its labratory force occupied with highly specialized tests, researches, analyses, and correlations of the earth's materials and structure both under and above the ground

While the geologists are mainly occupied pursuing scientific investigations originating in the Survey, many inquiries relating to minerals are received from unofficial sources. The Geological Survey identifies several thousand specimens each year. Vacationists or hunters walking in the mountains, farmers plowing their fields, and laborers making excavations in the ground, find minerals that look interesting which they hope may be valuable.

Occasionally indications of mineral deposits of present or potential value are found in this way. Rarely new minerals may be brought to light. By far the larger number of specimens received, however, are found to be iron pyrites, yellow mica, and quartz, which are of commercial value only under special circumstances with respect to purity of the material, size of the deposit, and availability to markets.

The commercial value of minerals in all branches of industry is very closely related to their natural markets with respect to points of consumption. The cost of transportation to markets is the determining factor in the development of many ore deposits. These costs are something like a tariff when cheap foreign ores are available at the seaboard, favoring the development of interior ores for interior points of consumption. Instances of this are the use of potash mined in New Mexico, natural soda and pyrite mined in California, phosphate mined in Idaho, and flourite mined in Illinois and Kentucky. Chemical industry seeks the nearest supplies in its utilization of raw materials for the production of serviceable goods, and is also constantly looking for new materials, differing slightly, perhaps, in composition or properties from customary material, but made available and useful through new methods of extraction and treatment.

The importance of sulphur and salt in the chemical industries has been mentioned. Besides these two raw materials several other mineral substances, such as gypsum, borax, sodium sulphate, bromides, potassium chloride, flourspar, phosphate rock, bauxite, limestone, magnesite, graphite, chromite, sand, barite, and various pigments are utilized directly or indirectly. The value of their annual production at the source is at least $100,000,000.

That these supplies are produced at a very reasonable figure, and constitute a real service to industry, is at once apparent by noting the value of the products made from them, or by means of them as they pass through successive stages of manufacture and fabrication. The values ultimately emerge as those of drugs, machines, crops, buildings and household supplies, and economic conveniences, ranging from bathtubs and airplanes to amusement apparatus. This is necessarily a very brief sketch of some of the problems relating to minerals and chemicals handled by the scientific staff of the United States Geological Survey.

SCENIC ALGOMA

(*Continued from page 9*)

covered in four feet of snow and when it is packed one makes amazing speed in most any direction. Trappers lay out their lines. Logging makes the silent valleys in the white pine country resound with life.

Then, while winter seems still to hold a firm grip on the land, suddenly in the woods a strange sight strikes the eye. The drabness of the leafless forest has gone. The birch forest on the west slopes, where the setting sun strikes it, glows with the color of old rose. The birch buds are swelling, billions of them joining to change the color of the forest. It is the first visible sign of the break-up, flooded brooks, and trout fishing.

Wild Fowl Perishing From Lack of Water in Breeding Regions

Canada and United States Attempting to Devise Methods for Preserving Adequate Supply of Birds.

REPORTS received by the Biological Survey, of the Department of Agriculture, indicate an "unprecedented drought" in the waterfowl breeding areas of the United States and Canada, turning lakes and ponds and marshes into "dusty barrens with no signs of aquatic life," the Survey announced July 29.

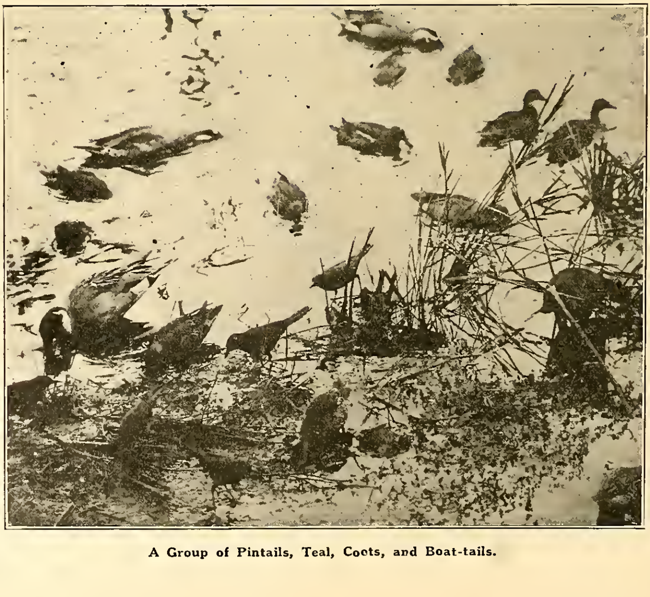
A large percentage of the wild fowl that make up the great flights are bred in the area thus seriously affected, the Survey said, and a serious shortage of breeding birds and loss of young is resulting. Both Canada and the United States are concerned over the situation, according to the Survey, and are attempting to devise methods to save an adequate supply of breeders for next season.

The announcement of the Survey follows in full text:

Severe limitation of the number of waterfowl to be killed the coming season may be necessary as a result of long-continued drought in nesting areas of the United States and Canada, officials of the Bureau of Biological Survey, United States Department of Agriculture, indicated today, after considering reports of Bureau representatives recently returned from expeditions to northern areas of the United States, and in company with Canadian officials to the principal duck-breeding areas in Canada.

Although Federal regulations governing the shooting of ducks and geese were recently amended to reduce the open season throughout the United States by two weeks this fall and winter, still further restriction of the annual kill may be necessary, the officials stated.

The Biological Survey investigators brought back discouraging reports of unprecedented drought, of lakes and ponds and marshes turned into dusty barrens with no sign of aquatic life.



A Group of Pintails, Teal, Coots, and Boat-tails.

They reported the almost complete absence of water during the breeding period in the great prairie breeding grounds of southwestern Manitoba, southern Saskatchewan as far north as Saskatoon, and Alberta westward to the foothills of the Rocky Mountains and northward to the vicinity of Edmonton.

A marked shortage of breeding ducks and young was noted in the great delta region of the Peace and Athabaska rivers. In tours of several thousand miles the investigators saw only a few dozen small broods of young ducks in an area that in normal years has produced many millions of mallards, pintails, redheads, canvasbacks, bluebills, and teals.

The shallow prairie sloughs and lakes of the region have disappeared following about 10 years of reduced rainfall and three seasons of persistent drouth. Biological Survey officials explained and a far-reaching inquiry sent out by the Canadian government has failed so far to show that the ducks have found other more remote breeding areas.

(*Continued on page 40*)

Problems Connected With Freezing of Fish

Manner in Which Bureau of Fisheries Seeks to Aid in Development of Project.

BY R. H. FIEDLER
Chief, Division of Fishery Industries, Bureau of Fisheries, Department of Commerce

MANY problems arise concerning the manufacture, storage, and distribution of frozen fishery products. Research by the Bureau of Fisheries several years ago demonstrated that fish frozen rapidly when defrosted would more nearly resemble the original fresh product in appearance, texture, and taste than would ordinarily slow-frozen fish. This is due to the fact that when fish is slow frozen it allows the formation of large ice crystals in the flesh which rupture the cell walls, thereby allowing many of the valuable minerals and other constituents of the fish to be dissipated upon defrosting.

This research led to an intensive package trade in frozen fish, and, in turn, sowed the seeds for our present frozen food industry. In fact, the strides made in the quick freezing of fishery products have been so rapid that the frozen food industry in general, which, according to one leader in it, is destined to become a $1,000,000,000 industry in the next decade, has been looking toward the frozen fish industry for guidance.

While the general problem involved in the quick freezing of fishery products has been fairly well solved, there are several other problems connected with this method of preservation which require a solution. One of these is in regard to the optimum temperature for quick freezing while others have to do with the oxidation and drying of frozen fishery products in storage, and the maintenance of a proper, uniform, constant temperature. If these latter conditions are unfavorable, frozen fish in storage will lose weight, and sometimes change in texture and color. Research is now in progress by the Bureau to overcome these difficulties in storage and a report will be issued soon on the findings, which will undoubtedly lead the way to improved methods for storing frozen fish in cold storage warehouses, and also aboard fishing vessels.

It has been found that the method of manufacture determines the market for fish meals and oils. Those produced at a high temperature are generally oxidized more or less and lose many of their valuable properties. Loss of these properties makes them unfit for animal or human food. This problem of manufacture has received consideration by the Bureau over a period of years, with the result that definite suggestions for improving present manufacturing processes in the menhaden industry, to produce a better grade product, have been made, as well as suggestions for improved methods of avoiding losses.

Biochemical studies of the Bureau, in cooperation with the Bureau of Chemistry and Soils, agricultural experiment stations, and State agencies, on fish meal and oil, produced by these improved manufacturing processes, have shown these products are ideal for animal feeding. Should these suggestions be followed, the menhaden industry alone would be in a position to effect an annual saving of about $400,000, and at the same time divert the manufactured products to a new trade at a considerably increased price.

A further experiment is being conducted to demonstrate the feasibility of using highly refined "fish flour" for human consumption. This experiment is being conducted in cooperation with the Bureau of Chemistry and Soils, the District of Columbia Dental Society, the District of Columbia Medical Association, and the Episcopal Home for Children, Washington, D. C.

Fishing costs are reflected in the price consumers pay for fish at the corner grocery store. In an effort to reduce this loss, relative to the upkeep of textile webbing, the Bureau has been studying the application of net preservative treatments to prolong the life of nets. The investment in nets in the United States and Alaska amounts to about $16,000,000 annually, and, roughly, it costs about $5,000,000 annually in replacement to these nets, which is due to deterioration and which is partly controllable. As a result of tests conducted by the Bureau, this loss can be lowered considerably by the application of preservative treatments devel-

(*Continued on page 40*)

Saving of Natural Resources Defined As Aim of Federal Bureau of Mines

Development of More Efficient and Safer Methods Sought in 11 Experiment Stations.

A. C. FIELDNER
Chief Engineer,
and
ALDEN H. EMERY
Assistant to Chief Engineer, Experiment Stations Division, United States Bureau of Mines

MINING ranks next to agriculture as the most important raw material industry of our country. But, unlike agriculture, the mineral industry cannot live on the interest of its investment, i. e., the annual crops, but must deplete its capital.

Since mineral resources are not renewable, each day's operation brings the capital resource nearer to exhaustion. It is therefore extremely important when considering the preservation of the economic wealth of the Nation and the maintenance of its present world position, that the losses connected with the mining treatment and utilization of its mineral wealth be reduced to a minimum.

The development of mining methods which will recover more ore from the ground, the improvement of treatment to produce larger quantities of valuable minerals from an ore, the discovery of procedures for making an unused low-grade material amenable to treatment, or the development of methods for the fuller utilization of the resultant product all are equivalent to the discovery of additional resources because they defer the time of exhaustion of existing mineral deposits.

Congress realized these facts in creating the United States Bureau of Mines. It saw that in order to foster the mining industry and to insure its continuance, as likewise the prosperity and well-being of the people of the Nation, particularly to those States where mining is a major industry, it would be necessary to conduct research having for its object the increasing of efficiency and the prevention of waste in the mineral industries.

At the same time it recognized the appalling waste of human resources which necessitated the development of safer mining practices. With these ends in view the United States Bureau of Mines was created by an act of Congress in 1910.

The exact wording of the organic act with reference to the duties of the Bureau is as follows:

"To conduct inquiries and scientific and technologic investigations concerning mining, and the preparation, treatment and utilization of mineral substances with a view to improving the health conditions, and increasing safety, efficiency, economic development and conserving resources through the prevention of waste in the mining, quarrying, metallurgical and other mineral industries; to inquire into the economic conditions affecting these industries; to investigate explosives and peat; and on behalf of the Government to investigate the mineral fuels and unfurnished mineral products belonging to or for the use of, the United States, with a view to their most efficient mining, preparation, treatment and use; and to disseminate information concerning these subjects in such manner as will best carry out the purposes of this act."

The experimental work of the Bureau of Mines is carried out at 11 experiment stations located at various points in the country (see figure 1). The results of investigations made at these experiment stations are published as bulletins, technical papers, miners' circulars, handbooks, reports of investigations and information circulars.

Many papers also appear in the technical journals, co-operative bulletins, and in publications of scientific organizations. These papers have liberal distribution and are available in libraries throughout the country. The Bureau has a limited number of copies that may be had free on request, and the Superintendent of Documents, in the United States Government Printing Office, has others that are available at a low price.

A printed list of publications and an index covering all Bureau reports printed by the Government, together with a mimeographed list of all the articles published by private agencies, is available on application to the Washington office or to any of the experiment stations.

Each of the 11 experiment stations has a certain field of study within which its major activities lie. It is also strategically located in some section of the country whose industries have related problems.

For example, the Pittsburgh Experiment Station, in the heart of the bituminous coal mining district, and in the center of a great iron and steel industry, directs its major attention to a study of the mining and treatment of coal and the various problems of ferrous metallurgy.

(*Continued on page 33*)

Bureau of Mines' Interest In By-Products of Coal

Relation of Research Work in This Field to Chemical Industry Discussed by Engineer

By A. C. FIELDNER
Chief Engineer, Experiment Station Division, Bureau of Mines, Department of Commerce

NONMETALLIC minerals comprise a major portion of the basic raw materials for industrial chemicals. Sulphuric acid is made by the oxidation of sulphur or pyrite. Chlorine and caustic soda are produced by the electrolysis of common salt. Limestone and salt are the raw materials used in the manufacture of sodium carbonate, or soda ash. Potash is largely extracted from saline deposits. Phosphorus and its compounds are produced by the treatment of phosphate rock with acid or by smelting the rock in furnaces at high temperatures.

Finally, coal, coke, oil and natural gas are indispensable, not only as the source of energy (heat) required in carrying out the necessary reaction involved in the manufacture of industrial chemicals, but as raw materials for the manufacture of carbon and other chemical products.

The research activities of the United States Bureau of Mines in the field of nonmetallic minerals which are of special interest to the manufacturer of industrial chemicals may be separated into two divisions:

1. Mining, preparation, processing and utilization of the mineral fuels—coal, petroleum, and natural gas.
2. Mining, beneficiation and utilization of other nonmetallic minerals.

Of these two divisions the work on fuels, and, in particular, that on coal and its products, probably covers the widest field with respect to the manufacture of industrial chemicals. While the use of coal as a fuel has been of prime importance for many years, recently it has become an important raw material for the production of synthetic chemicals as well. Methanol and ammonia are the two outstanding products which now are made largely from water gas, which, in turn, is made from coke, the residue from coal carbonization.

In connection with the development of the methanol process, the Bureau determined experimentally important data on equilibrium and the mechanism of the reaction in which methanol is formed from water gas. Similar work has been and is now being conducted on the production of synthetic chemicals from natural gas and from water gas through the use of catalytic materials.

In these researches, the attempt is not primarily to invent a process, but rather to investigate the fundamental physical chemistry of the possible reactions and to publish this information for the benefit of the chemical process industries which may be interested in the better investigation of these carbon and hydrogen containing raw materials.

In order to provide comprehensive information on the suitability of different types of coal for processing, the United States Bureau of Mines is now engaged on a survey of the gas, coke and by-product making properties of American coals This investigation is being conducted at the Pittsburgh Experiment Station in cooperation with the American Gas Association, on coals from various regions of the country. Special attention is being given to the chemical by-products obtainable at various carbonizing temperatures. The methods of test developed in this survey have been successfully used by one of the large manufacturers of synthetic methanol, in improving the quality of the coke used in their process.

Although handicapped by limited appropriations, the Bureau has done some significant work in the large and varied field of nonmetallic minerals. Crushing, grinding, classification, washing and flotation of impure nonmetallic materials to produce pure products have been conducted at the Mississippi Valley and Southern Experiment Stations, situated at Rolla, Mo., and Tuscaloosa, Ala., respectively, and working in cooperation

(Continued on page 33)

Use of Transparent Wrappers Developing Rapidly in Europe

Paper Industry Devising Impregnating Processes as Well as Cellulose Products.

THE varied uses and growing potentialities of transparent wrapping paper, as evidenced by the development of cellulose sheeting of this type, are attracting greater attention on the part of the European paper industry which is now developing a number of paper impregnating processes with the object of maximum transparency in view, according to a report received from Commercial Attache Marquard Lund at Oslo.

Impregnation, as a paper converting process, has developed very rapidly in Europe during recent years, although it has by no means attained the importance and proportion that it has in the United States. The more common processes, such as waxing, oiling, and asphalting, have been known for years, but the use of such papers, compared to the American consumption is quite in its infancy in Europe. On the other hand, certain processes have been developed here, notably in the manufacture of transparent papers, and are more extensively used than in the United States.

European trade leaders state that the advantages of transparency in wrapping materials have always been obvious, but never to such an extent as with the development of transparent cellulose sheeting. Because of the investment necessary in its manufacture, and possible patent infringement litigation, there have been comparatively few competitive developments, except in cheaper imitations. Some of these are gelatine, and others impregnating processes.

Impregnating is the least expensive, of course, requiring comparatively simple equipment. The solutions used seem to have a varnish base, although the actual composition is the secret of the manufacturer, and analysis is difficult. There has been a gradual improvement in the quality of these types of paper, most of which are produced from a tissue paper base, but the perfection of transparent cellulose sheeting has not been reached, according to European trade opinion. Much further research is necessary before this can be hoped for, the trade believes.

The vogue for transparent wrappings has also been taken up by vegetable parchment manufacturers. In Germany, so-called silver parchments have appeared on the market, while in Sweden one of the leading paper manufacturers has brought out a product apparently parchmentized to an unusual degree of transparency.

A parchmentized kraft paper was recently introduced on the market by a German manufacturer, which opens up another possibility for the use of kraft paper. The product is reported to be manufactured by a process similar to that used in the production of ordinary vegetable parchment papers, except that an unsized kraft paper is used instead of an unsized sulphite paper.—*Issued by the Department of Commerce.*

Forests Influence Amount of Moisture In the Air

Forests influence the amount of moisture in the air as well as conserve the water in the ground. Humidity records taken by the Pacific Northwest Forest Experiment Station in a Douglas fir forest, before and after the trees were cut, indicated a remarkable difference in atmospheric humidity, according to the Forest Service, United States Department of Agriculture.

In the forested area the relative humidity fell below 35 per cent in only one-third as many hours as in an open area near by. After the forested tract was cut over, the atmosphere above it appeared to become almost as dry as that over the open space. The tests showed that the removal of the trees increased the number of hours during which the humidity was below 35 per cent, by two and one-half times.

Dogs Raise Federal Ire and Take Trip to Pound

Dogs that run loose and hunt wild game out of season now have the federal government after them.

To protect game, especially deer in the Pisgah National Forest in North Carolina, the Secretary of Agriculture has autorized the forest and game officers to impound all dogs found running at large, says a bulletin of the American Game Association.

The game commissioners of Maryland, Pennsylvania and other states, have ordered strict control of stray and unlicensed dogs seen chasing game, declaring them to be highly destructive to wild life during the breeding season.

Canned Fishery Products and By-Products South Atlantic Gulf States

By LEWIS RADCLIFF
Deputy Commissioner,
U. S. Bureau of Fisheries

In 1930 the production of canned fishery products in the United States amounted to 576,685,454 pounds valued at $82,858,261, and the value of fishery by-products was $23,720,778. The value of canned fishery products in the South Atlantic and Gulf States was $6,942,894, and by-products $3,106,148. The values of canned products and by-products by States follow:

States	Canned	By-Products
North Carolina	$ 148,419	$ 350,129
South Carolina	633,115	189,635
Georgia	458,733	132,784
Florida	719,638	997,287
Alabama	259,696	46,774
Mississippi	1,639,767	295,776
Louisiana	2,601,990	1,084,175
Texas	481,536	9,588
Total	$6,942,894	$3,106,148

The most important canned fishery product was shrimp, a distinctly southern industry. In 1930 the production amounted to 818,616 standard cases valued at $4,961,622. (A standard case as used here represents the various sized cases converted to the equivalent of forty-eight No. 1, 5-ounce cans to the case in the dry pack and forty-eight No. 5¾-ounce cans to the case in the wet pack.) Production by States follow:

States	Standard Cases	Value
North and S. Carolina	53,408	$ 311,656
Georgia	75,744	437,741
Florida	69,372	491,231
Alabama	43,942	246,768
Mississippi	107,302	605,405
Louisiana	401,817	2,405,197
Texas	67,031	463,624
Total	818,616	$4,961,622

The most generally manufactured by-products produced in the South Atlantic and Gulf States are oyster shell products. In 1930, production amounted to 221,192 tons valued at $1,716,874. Production by States follow:

States	Tons	Value
North Carolina	960	$ 4,780
South Carolina	16,305	126,760
Florida	23,182	216,026
Alabama	6,627	42,189
Mississippi	46,396	275,767
Louisiana and Texas	127,722	1,051,352
Total	221,192	$1,716,874

North Carolina. — The products canned in North Carolina, included shrimp, oysters, and the roe of river herring or alewives. By-products included menhaden scrap and meal, oil, and oyster shell products. Production of scrap and meal amounted to 7,730 tons, valued at $2,932,472, and oil 308,472 gallons, valued at $51,877.

South Carolina. — Shrimp and oysters were canned to the amount of 128,970 standard cases, valued at $633,115. By-products produced included menhaden scrap and oil, and oyster shell products.

Georgia.—Canned products from Georgia included shrimp, oysters, clam and terrapin products. Menhaden products were the only by-products produced.

Florida.—Products canned in Florida were shrimp, oysters, clam products, and turtle products. By-products included menhaden scrap, meal, and oil, shrimp meal, shark products, oyster shell products, etc.

Alabama.—Products canned in Alabama were shrimp and oysters. By-products produced were shrimp meal and oyster shell products.

Mississippi.—Products canned were shrimp and oysters, and by-products were shrimp meal and oyster shell products. The pack of oysters in Mississippi amounted to 224,921 standard cases, valued at $1,639,767.

Louisiana.—Products canned were shrimp and oysters. The pack of shrimp amounted to 401,117 cases, valued at $2,405,197. By-products included shrimp meal and bran, oyster shell products, and shark products. The pack of oysters amounted to 39,738 cases, valued at $196,793.

Texas—Products canned included shrimp and oysters. By-products were confined to oyster shell products.

While the production of shrimp in the South Atlantic and Gulf States has increased at an astonishingly rapid rate, now exceeding 100,000,000 pounds per annum, only a small part of the waste is utilized, and that not to the best advantage. Production of shrimp meal and bran in the South Atlantic and Gulf States in 1930 was only 2,266 tons, valued at $62,545. While there was a potential supply of about 40,000,000 pounds of shrimp waste, it therefore appears that only about one-half of this material was used. Shrimp by-products are rich in iodine and mineral con-

(*Continued on page 35*)

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Conservation Versus Progress

Will We Continue to Rob Future Generations?

BY MARTIN R. GOSHORN

Farmer-Member, Indiana Conservation Commission

"LEST we forget." These words, when immortalized by the poet laureate of England were intended more particularly to arouse the people of a great nation to a sense of the dangers and hazards of war.

A surer and more terrible calamity confronts every nation than even the evils of war. While war takes its toll of life and property, and jeopardizes the peace and tranquility of every home for a time, it's effects are temporary, and the wound it makes soon heals and the race moves on.

That humanity may happily perpetuate itself, the question of conservation and restoration of earth's natural resources is the all important one,

When God created the earth he made it a huge storehouse for men. The command was, "Subdue and have dominion over." Man was to be the "dresser and keeper." He was never given the authority to destroy. The gifts were for the race and not a generation.

If properly cared for they were ample and sufficient for all time. Many of them were in themselves, under proper conditions, recreative, and if man had used his energies in dressing and keeping instead of selfishly destroying them there would be no diminishing of the supply. But greed and selfishness have apparently ruled. The trail of what we call progress is littered with ruins and destruction.

We may rob nature but we will bring upon ourselves and our posterity the inevitable punishment. Both the crime and the penalty move stealthily and almost unnoticed. Generations must pass before the climax is reached. Yet before we are aware—as individuals, as communities and as nations—we find ourselves the victims of our own incompetent stewardship.

Man may be termed as originally a sportsman. In primitive times he supported himself by taking of the wild life, animal and vegetable, (or that which was) which was necessary for his sustenance. To this he gradually added the occupation of agriculture. To both the huntsman and the agriculturalist the virgin forests were of utmost importance.

For the hunter it was the habitat for the quarry. It was his sanctuary from the elements and it provided the logs for his cabin. From it the pioneer farmer took the timber for his buildings, the rails for his fences, the logs and puncheon for his bridges. It furnished him his fuel and the wood from which he made the pristine furniture and household utensils. Besides these it broke the storms, tempered the climate and provided for him a rich humous soil, built up of roots and leaf mold, upon which to grow his crops. He was surrounded by all that was necessary for a comfortable and happy subsistence. But like all other peoples, he had the natural craving for gold, and thoughtlessly exchanges his inheritance for that which in itself cannot sustain life.

The experiences of the older Asiatic and African civilizations show us in a conclusive manner how by robbing nature man brings upon himself the most dire consequences. And to-day the newer countries, like our own, are called upon to furnish food and clothing for the millions of sick and starving people of the ravished, depleted countries of the Orient.

If these people had conserved and judiciously kept and developed the primeval wealth of their lands, the present state of affairs would not exist. They wasted their heritage. They transgressed against the laws of nature and brought upon themselves the inevitable, namely starvation, which is the most horrible of temporal punishments.

In America we are following them entirely too far. We have already wantonly destroyed one of the most prodigious treasures of wild life, we have wasted an inestimable wealth of primitive forests, and now we are continuing our open principle of rapine to the soil itself. The virgin soil of millions of our once productive acres is so completely plundered that it faces us as an eyesore to our community, and a hideous monument to a nation's lack of conservation.

Worse than this we are not only robbing the treasure-house of its visible supplies, but we are tampering with the natural order of things to the extent that we destroy or delay for ages the possibility for their restoration. Nature works slowly in her reconstructive program.

The great humous sponge of roots and leaf mold hold a most important place in the harmonious relationship of life and matter. Through its absorbitive and evaporative proclivities it becomes

(*Continued on page 33*)

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SAVING OF NATURAL RESOURCES DEFINED AS AIM OF FEDERAL BUREAU OF MINES

(*Continued from page 26*)

The Petroleum Experiment Station is logically located at Bartlesville, Okla. Arizona's mines largely produce low-grade copper ores; hence, the Southwest Experiment Station at Tucson, Ariz., investigates the mining and treatment of the low-grade copper ores typical of that part of the country.

It is natural that these stations with problems of considerable local importance should work in harmonious contact and co-operation with the various State Departments of Mines and University Departments of Mining and Metallurgy. In several places formal co-operative agreements link certain types of research conducted by the two organizations.

BUREAU OF MINES' INTEREST IN BY-PRODUCTS OF COAL

(*Continued from page 27*)

with the Missouri School of Mines and Metallurgy, and with the University of Alabama.

The industrial chemicals industry is interested in the development of a flotation process for recovering 98 per cent flourspar from a low-grade ore, formerly of little value; the development of a flotation process applicable to low-grade bauxite ore, the product from which may be used for the production of aluminum salts; and the improvement of screening methods and application of hydraulic classification and flotation to the reclaiming of calcium phosphate from the land-pebble district of Florida.

The Nonmetallic Minerals Experiment Station of the Bureau at Rutgers University, New Brunswick, N. J., is at present occupied principally with the development of methods for the extraction of potash from saline minerals and rocks, Several processes have been developed on a small, laboratory scale for producing pure potassium sulphate or complex sulphates, such as syngenite ($CaSO_4K_2SO_4$), or schonite ($MgSO_4K_2SO_4$), from Texas and New Mexico polyhalite. These data have been published in order to stimulate the establishment of an American potash industry.

Development on a semiworks scale is being conducted by the United States Bureau of Mines at Highland Park, N. J., in a well-equipped chemical engineering research laboratory. Other sources of potash, such as the green-sands of New Jersey, alunite of Utah, and leucite of Wyoming, are being similarly investigated. It is expected that the Chemical Engineering Research Laboratory of the Nonmetallic Minerals Experiment Station, after completion of the potash problem, will take up other investigations that will be of special interest to the industrial chemical industry.

Many divisions of the Bureau's activities participate in the field of nonmetallic minerals investigations. The important statistical reports of the Economics Branch; the humanitarian work of the Health and Safety Branch; and the studies of mining methods and costs of the Mining Division, are major services rendered to the nonmetallic mineral industry and through them to the industrial chemical industry. They will be discussed in subsequent papers of this series.

CONSERVATION VERSUS PROGRESS

(*Continued from page 31*)

the dispenser of the water that falls upon it in the form of rain and snow. In its natural state it governs the runoff regulating the surface drainage, the stream flow, the substratum water supply, and to a degree the humidity of the atmosphere.

For many ages nature has been developing this great sponge blanket for the earth. It is the fat of the earth like the cream that rises to the surface of the milk. To destroy it is suicide to the race. Nature had thrown about it a safeguard of vegetable life. When we unscrupulously remove the timber, shrubs and native grasses, and their accompanying influences, we immediately lose the most important factor of natural control and throw everything into a state of chaos.

The accumulated wealth of the soil washes to the sea. The subsoil becomes an impervious watershed. Floods spread havoc in their trail, and the periodic droughts leave death and devastation in their wake.

Atmospheric conditions and temperature changes become extreme and severe. Heat and cold, freezing and thawing, floods and droughts, erosion and sedimentation, all work in quick succession and the result comes.

When we consider the horrible results of destroying the riches of nature we are made to feel with Kipling that the people should be aroused to a sense of their possible doom unless the principles of conservation are recognized and adopted.

"Lord God of Hosts, be with us yet
Lest we forget—lest we forget."

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CITIES SERVICE UNITS

NATURAL CYCLES—A MYSTERY OF LIFE

(*Continued from page 17*)

certain conditions and with certain diseases the power of a disease varies in close harmony with the general health of the animals wich it attacks. Under other circumstances a more virluent parasite may be so strong that no animal can resist it. But all organisms from bacterial parasites to whales appear to pass through cycles of strength and weakness arising from the combined effects of food, conditions of reproduction, parasites, and the immediate climatic environment."

Temperature and rainfall received a great deal of attention at the Matamek conference. It was shown also ultra violet light has a great effect upon reproduction in birds, while variations in humidity studied in relation to human health and activity, was found to have an extremely important part quite separate from actual temperature. Hitherto the study of such factors has been badly neglected, for it is clear that the general reactions of men, animals, and plants to physical environment are astoundingly alike. "Certain great laws seem to run all the way through the whole realm of life, and one result of the working of these laws is that cycles are very wide-spread phenomena."

Another interesting aspect of the conference was the evidence that in the great tropical forests where land mammals are fewest in number they are less subject to cycles, due possibly to either or both of two causes, their fewness and uniformity of their surroundings. In those high latitudes where climatic fluctuations are not harmful, cycles are also less apparent, but in the dryer and colder parts of the continents of the world, where only a slight change in climate may produce a vast change in food supply, conditions of reproduction or bacterial infection, animals show greatest periodicity, increasing enormously at certain times and then declining with a spectacular crash.

The broad survey accomplished by the conference brought together for the first time an immense mass of evidence indicating the sensitivity of life in all its forms to certain rhythmic influences whose nature remains still unknown. It is of high interest that, for example, in the studies of the Wisconsin grouse and rabbits it was found that their cycles appeared to be modified and reduced in those areas more populated by man. The recognition and consideration of these natural cycles are of profound importance in practical conservation, since it is evident that although they exist often in such astonishing magnitude, they may yet be capable of some control. Even were no remedial control measure possible, it is clear that conservation and protection to be effective must be planned with the knowledge of these strange natural rhythms.

CANNED FISHERY PRODUCTS AND BY-PRODUCTS

(*Continued from page 29*)

tent and if properly produced should be used for animal feeding at a price considerably higher than shrimp by-products now command.

It is also important in the production of fish meal and oil that modern equipment be employed, preferably steam or vacuum processes, to produce the highest grade of feed, and care should be exercised in the production of oil to produce a product suitable for animal feeding as a substitute for imported cod-liver oil. Persons contemplating producing oil for this purpose should make suitable arrangements for having their oils produced tested as to vitamin potency, and only oils meeting the requirements of the stock feeders introduced into this market.

With the proper development of oyster farming in the South, production of oysters should be greatly increased and stabilized, and the quality of oysters produced enhanced. In general it may be stated that as the importance of sea foods becomes better recognized, and as the industry more carefully standardizes its products, the importance of the fishery industries to the South should be much better appreciated.

Two Homes Not Enough—Fish Sports Two Names

A fish having two homes, two names and a habit of changing its name every time it changes its home, not to mention vice versa, recently brought a legal puzzle upon the Michigan Department of Conservation.

It was not until Dr. Carl L. Hubbs of the state's Institute for Fisheries Research was called in with scientific data that the deep water steelheads were proved to be rainbow trout at one stage of their restless life.

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Louisiana Nature Guardians

"Upon my honor, as a Louisiana Nature Guardian, I promise to take care of all our natural friends, to guard and protect them to the best of my ability, and as far as possible influence others to do the same."

WHEN the Nature Guardian Club of Louisiana was formed several years ago, it met an instant and hearty response from the teachers and the school children all over the State. From a small interested group it has grown steadily into a mighty force of thousands of young conservationists. These children are the proud possessors of handsome lithographed badges, and certificates of membership. New Clubs are being formed each week and it is the purpose of the Educational Bureau to enroll every Louisiana boy and girl, white or colored, under the Nature Guardian banner.

HOW YOU CAN BECOME A NATURE GUARDIAN

YOUR PART

Consult your teacher.

Ask that the purpose and plans of the Nature Guardian Club be explained to you and the class.

Ask for an application card.

Get a responsible person to indorse it, after proving that you fully understand the duties of a Nature Guardian.

Sign the application and mail the card, or give to your teacher, to send with cards from all the class.

OUR PART

We send the application card.

We send you a handsome badge, a certificate of membership, Nature Guardian pamphlets and other literature.

This is all free, and is carried on with the purpose of instilling into the children's minds a knowledge of Louisiana's wild life and a thorough understanding of its economic value to the State.

It also aims to develop individual humanitarianism. Even within this short time an amazing improvement has been made in the mental attitude of our young folks toward the conservation and protection of Louisiana's natural resources.

EDITORIAL

MY DEAR GUARDIANS:

You read this magazine each month and like to see your own letters and those of other Guardians in this column. Do you ever stop to consider why we are putting forth such efforts to make you boys and girls think seriously about this great subject of Conservation?

It is because so many mistakes have been made in the past in reference to the using of the natural resources of our State and our Country. These have been wasted and exploited so steadily throughout the years that the time has come for everyone in this great country of ours to help in some way to avert disaster.

Let us take our Louisiana forests as an instance for consideration. At one time they were practically inexhaustible. But today finds us facing the fact that the next 15 years will see nearly the end of the large production of virgin yellow pine in this State. They tell us that the cypress will be out in five years or less, and that our hardwoods will be exhausted in the next 24 years. Nothing will help us replace our forest resources except a well carried out plan of reforestation and fire protection.

"Protection from fire, selective logging, and care in cutting the final stand, are the essentials of the wise use of the forest lands," says a member of the Conservation Department. If these fundamental requirements are put into practice, it is assured that most of the 17 million acres of forest land in the State will be kept productive.

Fire protection is a big factor in forest protection, and here are a few rules taken from the Wisconsin Conservation Commission:

SIX RULES FOR PREVENTING FIRE IN THE FORESTS

1. *Matches*—Be sure your match is out. Break it in two before you throw it away.
2. *Tobacco*—Be sure that pipe ashes and cigar or cigarette stubs are dead before throwing them away. Never throw them into brush, leaves, or needles.
3. *Making Camp*—Before building a fire, scrape away all inflammable material from a spot five feet in diameter. Dig a hole in the center and in it build your camp fire. Keep your fire small. Never build it against trees or logs, or near brush.
4. *Breaking Camp*—Never break camp until your fire is out—dead out.
5. *Brush Burning*—Never burn slash or brush in windy weather, or while there is the slightest danger that the fire will get away.

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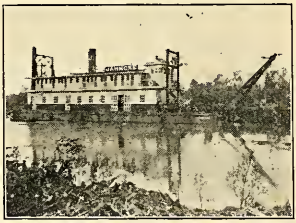
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6. *How to Put Out a Camp Fire*—Stir the coals while soaking them with water. Turn small sticks and drench both sides. Wet the ground around the fire. Be sure the last spark is dead.

With love to each Guardian,

Sincerely yours,

THE EDITOR.

Here is a nice letter of thanks dated July 25th, from one of our honorary Guardians in St. Louis, and a Boy Scout, too:

3951 Ohio Ave.,
St. Louis, Mo.

DEAR EDITOR: I want to thank you for the trouble you have taken to send me the book of fishing, forestry, etc., because I think that by reading that, it has helped me a lot in ways of telling fish and trees. It has also helped me out a lot in the study of bird life. I am a Boy Scout and one of my tests is to be able to tell trees and the tree studies you have in the book have helped me a lot. I am closing now and again want to thank you for sending me these books published monthly by you.

Yours truly,

Harry January,

And here is one from the same city who wants to join our band:

741 Walton Ave.,
St. Louis, Mo.

DEAR EDITOR: Please send me an application blank for membership in your Nature Guardian Club. I have always liked to go on a picnic for three reasons: The enjoyable ride with beautiful scenery, the good things to eat, and the walk after dinner through the woods filled with tiny streams, wild flowers, mosses, ferns and many colored birds.

I have a squirrel and a cat for my pets. If I see any sort of animal or insect in trouble, I try my best to help it.

We have a Nature Club at my school. We try to see who can see the most spring flowers and birds in a certain length of time.

We have many wild flowers in our back yard. I have a lemon plant. (It's too little to be called a lemon tree).

Hoping I will receive my pins, etc., soon.

Yours truly,

Alice Mary Leffler.

---

741 Walton St.,
St. Louis, Mo.

DEAR EDITOR: I want to tell you about a trip my family took one Sunday last June to see Cold Water Creek. We had packed the foods that wouldn't spoil in a large box and put the others in the ice box. As soon as we were out of the city limits, the family settled back to enjoy a good country ride. All along the fields we saw Red-Winged Blackbirds, meadow larks and the common English Sparrow.

We asked the direction in a little town called Black Jack.

In the middle of the road a brown, furry little creature hopped away wiggling its pointed ears. We started unpacking as soon as we had arrived and my father and I soon had a small wood fire blazing with the coffee pot and frankfurters on a grill stove.

After lunch, I wandered down a little hill and came upon a little lake, where there were some people fishing. They asked me if I wanted to try. I answered "yes" and I soon had a nibble. I jerked my line out and for goodness sakes! I had caught a fish. I put it in a can with some water in it but it wiggled so pitifully that I put it back while they weren't looking and slipped away to camp. I read my book for a while and then mother suggested we all take a walk in the woods near by. In the woods we had a carpet of moss, damp leaves. Dutchman's Britches, Lilies (I do not know their names), May apples and oh! a hundred or more different flowers.

As we were coming back to camp mother almost stepped on a Water Moccasin. We decided to leave it alone for if there were other snakes about they would probably seek revenge.

I think I had a most enjoyable trip, don't you?

Yours very truly,

Alice May.

P. S. Before we left we got some water from the creek and put out the fire.

We wish we could have been present on this trip! Our Louisiana woods are hung with lovely Spanish moss, that sways to and fro with every passing breeze. I am sure you would enjoy a visit to our woods and swamps as much as all the Guardians would enjoy one to the scenes of your trip.

Leighton is just the kind of member who will help make our Club a success. We welcome him into the ranks.

Goodpine, La.

DEAR EDITOR: Please send me an application blank for membership in your Nature Guardian Club. I am very anxious to be a member and will do what I can to promote your club in my school.

Respectfully,

Leighton Smith.

An old member sends us a lovely bit of poetry that you will all enjoy:

Lutcher, La.

DEAR EDITOR: This will be a pleasure to write to you all. I am a member of your Club and hope to always be. I love to go in the woods and see all the beautiful animals.

Hill Memorial Library
Louisiana State University

I have still the badge and certificate which you gave us. I am sending you all two little poems with this letter. I hope you do take notice of these. I have gone to visit the Department of Conservation. I surely enjoyed the trip. I will write again. I hope you send me a book next time.

Yours truly,
Lucy Mae Trosclair.

"Every pine and fir and hemlock
Wore ermine too dear for an earl,
And the poorest twig on the elm tree.
Was ridged inch deep with pearl.

"I stood and watched by the window,
The noiseless work of the sky,
And the sudden flurries of snow birds,
Like brown leaves whirling by."

Here comes Mabel rapping at the door! Welcome!

Amite, La.

DEAR EDITOR: I would like to join your Nature Guardian Club. Please send application blank and pin. I am very anxious to be a member. I will also try to encourage your Club to all my friends.

Yours truly,
Mabel Whittington.

"Among those present" as new members are the following:

Felice Hicks
824 E. Kings Hwy.,
Shreveport, La.

Ellen Day
938 Boulevard,
Shreveport, La.

Kittie J. Osborn,
South Highlands,
Shreveport, La.

Alice Ward
586 Oneonta St.,
Shreveport, La.

Ola Mae Powers
Pollock, La.

Lucy Powers
Pollock, La.

Mary L. Doll
3312 Fairfield Ave.,
Shreveport, La.

Mai Cornell
Belcher, La.

Mattie Cornell
Belcher, La.

Birdie Compton
Alexandria, La.

Ruthie Kreager
University Acres,
Baton Rouge, La.

Sue Eleanor Brown
University Station.
Baton Rouge, La.

We shall be glad to hear from our members at any time, and shall be glad to print their poems, themes, and letters about any of the natural resources of Louisiana. We hope that our next issue will contain many interesting articles by members of our Club.

Address all letters to: NATURE GUARDIAN EDITOR, DEPARTMENT OF CONSERVATION, New Court Building, New Orleans, La.

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WILD FOWL PERISHING FROM LACK OF WATER IN BREEDING REGIONS

(*Continued from page 24*)

Not all the ducks and geese that come into the United States are bred in the region surveyed, it was said, but a very large proportion of the wild fowl that make up the great flights know that country as their birthplace, and the shortage of breeding birds and the loss of so many young will have a serious effect upon shooting conditions both in this country and in Canada.

The Canadian and United States governments under the migratory bird treaty, it was pointed out at the Biological Survey, are both concerned over the disastrous conditions that now threaten the wild fowl of the continent.

The two governments are therefore endeavoring to avert shortages by devising methods for saving an adequate supply of breeders for next season. The severity of the limitations that may be necessary will not be determined definitely, the Biological Survey officials say, until after further conferences between the authorities of Canada and of the United States, and until more information is received from the nesting grounds.

It is apparent, however, they say, that the drouth, which has caused so much distress and economic loss to farmers and to industry generally, will also directly affect the sportsman. To avert the grave possibilities of a permanent disaster to the wild fowl, the gunners in all sections of both countries will probably be asked to reduce their duck shooting this winter to a minimum.

PROBLEMS CONNECTED WITH FREEZING OF FISH

(*Continued from page 25*)

oped during the past several years, the formulae of which were recently published by the Bureau in pamphlet form.

The above are only a few ways in which the Bureau is aiding the fisheries by applying to it the results of fundamental chemical and technological research. Suffice is it to state that in addition to the above new and improved methods have been developed in past years for canning fish as sardines, salting fish in warm climates, manufacturing from fish scales pearl essence, which is later used for making pearl beads, and others, all of which have enabled the fisheries to manufacture uniform, high quality products, reduce overhead, utilize by-products, and find new outlets for the various fishery products.

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A 38 percent gain in knowledge on specified "educational subjects," such as butterflies, glaciers, volcanoes, rivers and toads, was registered on tests conducted with eighth grade students. A doubling of knowledge, on the average, was reported by those who conducted the tests, in summarizing the general gain in knowledge by the 47 girls and 50 boys, picked from eighth grade graduates in 47 states.

A committee of experts named by the United States commissioner of education conducted the tests after the Fox Film Corporation prepared the pictures. The boys and girls were given preliminary tests to sound out their knowledge on the selected subjects, and after seeing the pictures, they were given another test. The pictures were only shown once. The subjects were selected, for the most part, because the students presumably had studied the subjects in grammar school.

"Boys and girls, who have presumably studied glaciers, volcanoes and river valleys," said the special committee report, "gained 42.5 percent, 79.8 percent, and 156.3 percent over their first scores on these subjects, respectively. In the field of science, which is less extensively taught in elementary schools than is geography, exceptionally high gains were made. These facts indicate a strong supplementary value in sound motion pictures."

Excerpt from circular No. 2890, January 21, 1931, by the Hon. T. H. Harris, Superintendent of Public Schools of the State of Louisiana, addressed to all Parish Superintendents and High-School Principals:

"I think it could be demonstrated that a child could learn more in thirty minutes concerning the natural resources, or the Industries, or certain of the institutions of Louisiana by looking at and listening to a properly prepared moving picture reel than he would learn in a year by reading textbooks on the same subject."

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